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Second Biennial Report

OF THE

STATE BOARD OF HEALTH

OF

CALIFORNIA,

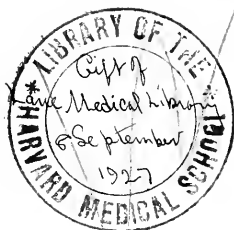
FOR THE YEARS 1871, 1872, AND 1873.



SACRAMENTO:

T. A. SPRINGER, STATE PRINTER

1873.



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REPORT
OF THE
STATE BOARD OF HEALTH.

1—(m)

MEMBERS

OF THE

State Board of Health of California.

HENRY GIBBONS, Sr., M. D., President.....	San Francisco.
L. C. LANE, M. D.....	San Francisco.
F. W. TODD, M. D.....	Stockton.
A. B. STOUT, M. D.*.....	San Francisco.
LUKE ROBINSON, M. D.....	Colusa.
J. F. MONTGOMERY, M. D.....	Sacramento.
THOMAS M. LOGAN, M. D., Secretary State Board of Health.....	Sacramento.

*Dr. Stout was appointed to supply the place of Dr. C. E. Stone, of Marysville, whose resignation was accepted at a meeting of the Board on April 12th, 1873.

GENERAL REPORT OF THE BOARD.

OFFICE OF STATE BOARD OF HEALTH,
SACRAMENTO, (Cal.), July 1st, 1873. }

To His Excellency,
NEWTON BOOTH,
Governor of California:

GOVERNOR: The Act establishing a State Board of Health, approved March eighteenth, eighteen hundred and seventy, prescribes, among the duties imposed upon the Board, that "they shall, at each biennial session of the Legislature, make a report of their doings, investigations, and discoveries, with such suggestions as to legislative action as they may deem proper."

In compliance with this requirement, I have the honor to submit, on behalf of the Board I represent, the accompanying report. It includes a digest of its proceedings from the date of the last biennial report in eighteen hundred and seventy-one, to the termination of the fiscal year, July first, eighteen hundred and seventy-three; also an account of various sanitary questions that have been discussed, and that are being still further prosecuted towards a beneficial termination—the measure in which our efforts have been successful, and such other information, recommendations, and suggestions, as in our judgment appear necessary, and as a sense of duty dictates for the still further maintenance and promotion of the public health.

In explanation of the delay attending its rendition, it may be proper to state that hopes have been entertained to the last hour of its retention, that the returns, in accordance with the law, respecting the registry of births, marriages, and deaths, would have been sufficiently complete to enable me to make a full report, for the first semester, on all the points of the important subject of vital statistics, as contemplated in Chapter II, Title VIII, of the Political Code, entitled "General Police of the State." This expectation, however, has not been fulfilled. The law, although simple and apparently easy of execution, has not been generally complied with, in consequence chiefly of some intrinsic defects in its framing and the resulting misunderstandings that have arisen respecting its details and workings. Accordingly the returns that have been received from such counties as have complied with its conditions, are too incomplete to be made available for the purposes for

which they were designed. This is only what might have been expected, and which has been the experience of every nation and State in the inauguration of such registration.

In its practical application to communities, sanitary science in this, as in every other particular, has the same difficulties to overcome here, as it has encountered everywhere. Restrictions in long established habits of life and business are submitted to slowly and with much reluctance. Personal convenience rises in antagonism to the principle, which requires each member of society to yield something of individual comfort for the general good. The people require to be educated to such necessity, and the importance of the sacrifice of their own convenience or personal interest. They are to learn that the record proof of the birth, marriage, or death of any person, or of all persons, may become of great importance from a legal standpoint; that the statistics derived therefrom furnish a sure index to the prosperity of the State in the number of births and marriages; that they supply data upon which governments, communities, and life insurers may base their action; and that they furnish knowledge of unfavorable locations and conditions, which, when known, may be avoided, and the struggle for life thereby rendered easier and more certain of success. It is a melancholy fact that this knowledge, of such great import and utility, never reaches the great mass of mankind. There is a too general ignorance of the fact that those who are, or who act nearest in harmony with the conditions in which they are placed, or control them the best, live the healthiest and happiest lives, and that the greatest amount of sickness, suffering, and death is the portion of those who disregard the laws of nature and do not live in harmony with their surroundings. Thus it seems true, now as ever, that "the people die for lack of knowledge," and the question forces itself upon us: How can we do justice to ourselves, our office, and the community, unless we speak out strongly and continuously until we are heard and heeded? Being only an advisory, and not an executive arm of the State, the most that we can do is to make recommendations to the Legislature, and to teach the people that there is a way of life, and that those who seek may find it. This we have done and will continue to do by means of our reports, lectures, and other publications, especially at times of impending danger from epidemic visitations.

There is another medium by which such teaching has been conveyed, and that is through the medical profession, which has almost exclusive possession of the information to which we refer, whether it be philosophical knowledge of the causes of disease and death, or simply empirical knowledge of prevention and cure, gained either by the accumulated experience of generation after generation, or the patient investigations of scientific explorers. Through the liberality and enlightened foresight of our Legislature, the information from this source is annually spread out on the pages of the transactions of our State Medical Society, at the expense of the State, and thus made accessible to all who wish to avail themselves of it.

There are also other measures, which we can only suggest, and which it remains for our legislators to enforce. I would instance, particularly, the imposition of compulsory penalties and fines. Besides these, there is still another instrumentality, by means of which the leading scientists of Great Britain have lately done so much. I refer to their efforts in the direction of "science teaching in schools." Through the Board of Regents of our State University, the State Board of Education, and the

numerous city and county school Boards, there is offered a grand field for just such efforts in turning the direction of the vast current of study, among the young of both sexes, towards that knowledge which tends directly to the preservation of life, and which is, therefore, worthy of a far higher consideration than that which tends simply to the adornment of society. It affords me unqualified satisfaction to be able to state, that in compliance with the expressed wishes of the indefatigable President of our State University, the Regents have taken the initiative, not only in establishing a Professorship of Sanitary Science in the curriculum of the medical department, but also purpose making it a part of this professorship to give such instruction to the students in the academic department, so that every graduating class can go out properly informed in the great art of preserving the individual and the public health. It remains for our city and county educational Boards to follow this praiseworthy example.

A synopsis of the special subjects constituting a course of lectures on sanitary science and its collaterals is inserted in the appendix of this report, as suggestive to the Directors of the various departments of public instruction. Doubtless there are to be found many, among the well-informed members of the medical profession, scattered throughout the State, and looked up to wherever there is a cluster of people intent upon educating their children, who would cheerfully coöperate in any scheme that may be devised for the dissemination of the knowledge they possess of the prevention of disease and death, of which the people have no conception whatever. A common regard for the interests of mankind demand it of them.

In what does our present advanced civilization differ from the less enlightened state of past ages? Is it not in our more perfect adaptation to and control over our own surroundings, and is not a still further advance rendered possible by the increased knowledge of the laws which govern them? By obedience to these laws, man is but placing himself in harmony with those of nature, where the reign of law is universal; and, as all man's command—all his powers over the forces of nature—are embraced in his knowledge of law, so, when he works in harmony with it, are those forces his servants, and when he does not work in harmony with law, are they terrible and destructive masters. The people need to know all this; they need to know that the teachings of modern science show that disease is not a *thing* or *entity*, as formerly believed, to come arbitrarily, or as a special visitation of an overruling power, but a *state* or modification of health—a perverted physiological process. To the charlatan, disease is a set of symptoms to be attacked by a variety of drugs—a drug for each symptom; but to the enlightened physician it is, in reality, but the course of nature in a living thing, which is not health. "In health, the balance of function is even; incline it to either side, and there is disease. That being so, just as the life process constitutes an individual, and puts him apart from his fellows, so must any alteration in it be individual and not general." (1) Such are the modern ideas of the nature of disease, and the people need to know that these advances in our knowledge have ever been made by the labor of men devoted to science and the search of truth for its own sake; and that when we ask our legislators for laws, and the enforcement of those laws, to enable us to give the people, whose interest they represent, positive information, based upon demonstrative truth,

(1) Sir William Gull, London.

concerning self-preservation, and the measures enumerated in the schedule of subjects embraced in the Code of public health, hereinafter inserted, we ask it in behalf of the masses, and not because it is essential either to our own safety or emolument. On the contrary, it would seem that the aim and objective point is to do away with the very necessity for the profession of medicine; for if we should succeed in accomplishing all that is desired, there would be nothing left for the physician to do, and prevention would ask little beyond individual knowledge.

Without going over the ground so intelligently cultivated by Herbert Spencer, let me ask, if, after all the learning acquired in our schools and colleges, is there a single graduate who knows anything of the prerequisites or value of longevity, or who has any useful knowledge of self-preservation? Is there one who knows what to do in a case of asphyxia or apparent death, whether produced by drowning, suffocation, bad air, or coal gas, or how to stop the flow of blood from an ordinary wound? Of what use is one's knowledge of the classics, mathematics, geography, grammar, etc., if placed under circumstances of danger from hemorrhage, or drowning, or poisoning, or any other accidental calamity, when not a moment is to be lost? It may be said that these are rare emergencies, but our every-day life is made up of experiences requiring just as complete and perfect knowledge of the laws of life.

What but ignorance as to the means we possess of controlling small-pox prevents it from being completely stamped out? What but this same ignorance enables cholera to follow with its fatal tread over the great routes of travel throughout the world? The laws of its propagation are substantially the laws of typhoid fevers, dysenteries, and other epidemics, of which it is hardly a metaphor to say that "they consist in the extension of a putrefactive process from matters outside the body to matters inside the body; diseases of which the very essence is filth; diseases which have no local habitation, except where putrefiable air or putrefiable water furnish means for their rise or propagation; diseases against which there may be found a complete security in the cultivation of public and private cleanliness." (1) What but the all-prevailing ignorance of this knowledge allows the accumulations of decaying organic matter and drainage into drinking water?

The importance of the instruction here advocated will appear still more urgent from another point of view. When we consider how many die prematurely, and how few men and women in middle or later life—indeed, how few young persons in the very bloom and spring-time of life—are thoroughly well. Look at the sallow cheeks, the dim eyes, the pain, the weariness, the irritability, the waste of life! Look at our lunatic asylums, filled to repletion as fast as we can build them! Again, look at the sad havoc disease and death have made within the last few years among the most eminent of our country. Look at our Senators and public men, the victims of an early grave or of hopeless paralysis. The English statesman, religiously observing his open-air exercise and other health-preserving measures, carries on his physical and intellectual power unbroken beyond the years of three score and ten. But where is the American statesman, who, like Palmerston, has served his country to his eighty-second year, or like Lyndhurst, has made his most eloquent efforts at the age of eighty-six?

(1) Report General Board of Health, Great Britain, 1858.

"It cannot be doubted that the physical sins, partly our own, and partly our ancestors—the transgressions of the race which produce this ill health—deduct infinitely from complete living. How often in our own observation do they make life a failure and a burden instead of a benefaction and a pleasure? The deductions from statistics leave no doubt that by physical transgressions, which might be avoided, more, much more, than one half of life, and its pleasures and usefulness, are needlessly sacrificed." (1)

It is by no means pretended that a mere knowledge of these laws, however perfect, would prevent entirely this violation, or that any attainable compliance with their requirements would completely exempt from all diseases. Man's necessities often compel him to transgress, and, in the absence of such compulsion, inclination would often lead him—in spite of knowledge—to sacrifice future good to present gratification. But, that it lies within our power to stay the prodigal waste of human life which marks us as a people, and that the right knowledge, impressed in the right way, would effect much, cannot be questioned. From the consideration of the value of hygienic knowledge, as a science, to be taught to all, and with the best advantage to those who are about to engage in the battle of life and to take their places as School Directors, members of Boards of Health, and other public officers, let us turn for one moment to consider what is its real or possible value to the State.

"Every man who is obstructed by sickness from working his work and doing his duty as a citizen, is necessarily a loss to the revenue of the State at large. If we have a community of ten thousand, with one hundred sick, the wealth-producing power of this one hundred is not only taken from the public purse, but ten or twenty citizens have to be told off to attend to them in their sickness; and during their term of illness the sustenance of the sick and their attendants is required to be obtained from public or private sources. But further, if from the severity of the disease five or ten adults—fathers and mothers—in this hundred die, the consequent loss to the community is difficult to calculate, as their children might require to be sustained, and the status of their families be deteriorated morally and materially." (2) Nor is this all. Dr. Playfair, of Manchester, England, has found, after careful inquiry, that in a mixed population of all ages, the number of sick bore the proportion to the number of deaths of twenty-eight to one, or for each death twenty-eight persons are usually sick. The accuracy of this ratio has been confirmed by other observers. (3) By this method, if the number of deaths in any given town or city be ascertained and multiplied by twenty-eight, a close approximation to the sick rate may be obtained. Applying this rule to San Francisco, it is found in the mortality table herein inserted, that during the year eighteen hundred and seventy-two the whole number of sick was eighty-eight thousand three hundred and twelve. It thus appears that a number corresponding to three fifths of the entire population were sick during that year. Enormous as is this aggregate of suffering and disease, it is small compared with some other cities. In New York it is found that the whole number of sick in eighteen hundred and sixty-six was seven

(1) Lecture on Sanitary Science, by A. B. Palmer, A. M., M. D., University of Michigan.

(2) Sir James Simpson, Bart., M. D., F. R. S.

(3) American Journal of Medical Sciences, October, 1865.

hundred and eighteen thousand and sixty, and in Philadelphia during the same year, four hundred and ninety-two thousand and ninety-six; total for the year, one million two hundred and ten thousand one hundred and fifty-six, or nearly three fourths of the entire population of those cities. No wonder at the necessity for keeping an army of fifty thousand physicians in more or less constant employment in the United States.

Such being the value of the health and lives of the citizens to the State, and such the proportion of disease to death, it is as impossible to estimate those sanitary measures and means, so definite and so accessible, that scarcely a single case of sickness, or death thereby, ought to occur in any civilized country, by the diseases which now carry off thousands and tens of thousands, as it is to estimate, in mere yellow gold, the value of the life of a father, however humble a laborer he may be, cut down prematurely by disease and death. How important, then, are not only State and municipal advisory Boards of Health, but State and National enactments looking to the conservation of public health. For, "be it remembered, as of legislative concern, that the physical strength of a people is an essential and main factor of state prosperity; that disease, so far as it affects the workers of the population, is in direct antagonism to industry; and that disease which affects the growing and reproductive parts of a population must also in part be regarded as tending to the deterioration of the race."⁽¹⁾ With this handwriting, "Deterioration of the race," shining on the wall of the not far distant future, the whole question rises above the sphere of mere local or State jurisdiction, and enters into the province of National administration. Surely, if education and agriculture, including the fostering care of young animals, are of sufficient importance to call for distinct departments of the Government, the public health, which lies at the foundation of individual and National progress, should with more reason receive the attention of our legislators. Humanity and our country need that our children have the same provident care as is now extended to colts and calves and lambs—that they should live and be strong and useful.

Influenced by such considerations, and acting as the executive officer of this Board, by and with the advice and consent of your Excellency and my colleagues, I have been sedulously engaged during the past two years of my official term, in endeavoring to realize the grand idea of a National Department of Health, proposed many years ago by Jeremy Bentham. I shall only touch on this scheme at this place, and observe that if such a plan could be inaugurated through the instrumentality of our State Boards of Health, the signs of impending epidemics might be so closely watched throughout the length and breadth of our extended territory, that signals of approaching or suspected danger—similar to those furnished of the weather by the Signal Service Department, at Washington—may be heralded long enough in advance to provide by means of sanitary measures against the possibility of the spreading of disease. In the furtherance of this scheme, I have, in the capacity of Chairman of a National Health Council Committee, composed of one physician from every State and Territory of the Union, appointed by the President of the American Medical Association, in eighteen hundred and seventy-one, attended two meetings—one in Philadelphia and another in St. Louis—for the purpose of carrying out the measures contemplated by said appoint-

(1) L. Sneade Brown; Thirteenth Report on Public Health, 1870; London.

ments, and, as will hereinafter be seen in my report to the Board, with a strong probability of accomplishing all that is desired. Resolutions were adopted at the latter meeting, and referred to the section on Public Hygiene and State Medicine, asking Congress to establish a National Sanitary Bureau, and requesting the United States Educational Bureau to so extend the scope of its inquiry as to include vital and mortuary statistics in relation to local, meteorological, and geological influences, and to disseminate the information so collected throughout the country.

An appeal will be made to the next Congress for the passage of a bill of a similar character to that which was introduced last session, a copy of which will be found in another part of this report, embracing the investigation of every conceivable subject connected with sanitary science. The passage of such a law will mark an era in our national history, and reflect luster on the administration inaugurating it.

The fact that the growth of sanitary knowledge has been so rapid in Great Britain and other European States, that the only barrier now in the way of the most sweeping and beneficent reform is the difficulty of finding a sufficient number of medical men, with the requisite preliminary education, to act as inspectors and other sanitary agents, is a sufficient demonstration of the political and economical value of the enterprise.

Dr. Farr, who, as Vital Statist of the Registrar General's Office, in Great Britain, has commanded the confidence of his own government and won golden opinions from students of statistics over the civilized world, has so high an estimate of the political importance of State Medicine that he "confidently predicts the eventual appointment of a Ministry of Public Health for the British Empire. Such a Ministry would divide itself into four departments: administration, medicine, engineering, and statistics; each of which should be organized so as to work in harmony with a council of health and executive heads. Each town should have its Board of Health and its health physician in communication with and in aid of the Central Board of Health." Very similar views have been expressed by Mr. Simon, Medical Officer to the Privy Council, and by Dr. Parkes, Professor of Military Hygiene in the Army Medical School. In Italy a system of district medical officers has been established to report on sanitary matters and disease, to collect statistics, and acquire such local knowledge of medical topography as shall enable them to advise on all points connected with the public health. In the States of the German Empire, and in the French Republic, State Medicine exhibits a more complete development. The following schedule of subjects embraced in the Code of Public Health, adopted by the Government of Germany, will indicate the character and scope of the investigations of a Board whose plan of operations may be regarded as a model and example for other similar Boards:

A.—Statistical; statistics of population; statistics of mortality; statistics of reproduction; statistics of sickness, accidents, etc.; statistics of dwellings; statistics of food; statistics of animal life.

B.—Topographical; physical geography, as connected with vigor, and longevity of the inhabitants of the districts; chemical analysis of the various soils, springs, wells, and rivers; changes of seasons, and weather (meteorological observations).

C.—Forensic medicine.

D.—Measures for the prevention of diseases; localities of buildings; purification of buildings and towns; removal of buildings; construction of nuisances;

water supply; drainage and sewerage; pavements; smoke nuisances; healthy progeny; sale of food (adulteration); sale of medicines and poisons; control of trades and occupations; locomotion, both on land and water, whether by steam or by other mechanical expedients; public amusements and recreations; public establishments; burial of the dead.

E.—Measures for the arrest and palliation of disease; 1, public dispensaries; 2, hospitals and infirmaries for the insane; 3, asylums for the deaf and dumb.

On the advent and during the prevalence of any important epidemic or pestilential disease: quarantine laws, vaccination, prevention and palliation of disease among animals.

The bill, to which reference has just been made, and which was presented at the last meeting of Congress, and referred to the Committee on Education and Labor, ⁽¹⁾ will be found even more comprehensive than the European method, embracing, as it does, the consideration of every conceivable subject that can possibly affect the health of the Nation. Besides being indorsed by the American Medical Association, and the leading sanitarians of the United States, it has received, in frequent private conferences, the expressed approval of numerous members of both houses of Congress, and will doubtless in due time become engrafted on our civil government.

I might here extend the discussion of the numerous and complicated elements of social existence, on which the true health of the people depends, and adduce further evidence from the action of other governments, as well as from other States of our Union, respecting the political and economical value of such instrumentalities as public Boards of Health, but it is here deemed unnecessary, as the subject will be renewed in another part of this report. There are few reasoning persons who will not readily admit, without logical proof, that there is such a thing as public health distinct from individual health, and that it needs preservation by public or national agencies. But there is one feature made prominent in the reports of the Massachusetts State Board of Health, which has enlisted the warmest commendations of sanitarians, and to which I would call special attention, viz: the policy of assigning "special investigations" to skilled and competent individuals. Such questions as analysis of water and food, chemical and microscopical investigations in general, and questions of engineering, must of necessity be committed to technical experts, while many other special inquiries will also be more effectively conducted, as exemplified in the reports referred to, by selected individuals, devoting themselves exclusively to their elucidation. In evidence of the beneficial results of such a policy to the Government, as well as to numerous sufferers from disease or wounds during our late civil war, the President of the Virginia State Board of Health ⁽²⁾ refers to the investigation and treatment of special affections established by the orders of the Surgeon General:

"In addition to the immediate results in returning to duty numbers of men who would otherwise, in all probability, have been permanently invalid, we have to chronicle among the fruits of these special investigations, such permanent acquisitions to medical science as the papers of

(1) See Appendix.

(2) J. L. Call, M. D.

Dr. De Costa, on functional disorders of the heart, and of Dr. S. Weir Mitchell, on injuries of nerves and their consequences."

Reference is also made to the excitement created a few years ago by the appearance of a destructive disease along the line of travel of Southern cattle to Northern markets. It was known as the Texas cattle disease, and was at first believed to be identical with the inveterate rinderpest of Europe. According to a report of the Department of Agriculture, "the losses from this disease, for a few years prior to the war and since its close, cannot be accurately stated, but undoubtedly amounts to several millions of dollars. * * * The mortality of eighteen hundred and sixty-eight alone, as reported by our returns, amounts to at least fifteen thousand, involving a loss of not less than five hundred thousand dollars." Now, as the results of a well directed scientific investigation, in which a number of special experts took each his appropriate field of inquiry, the Commissioner of Agriculture felt himself warranted in dispelling the apprehensions entertained by many that the disease in question was the cattle plague of Europe, and in giving public assurance "that its ravages may be easily confined in circumscribed limits, if not prevented altogether, by judicious legislation, which shall not seriously interfere with the freedom or the profits of the cattle trade. (1)

These illustrations of the practical utility of special investigations are referred to, not merely as examples of the particular class of inquiries it would be expedient for us to make, but as exhibiting palpable and valuable results, easily appreciable by the popular mind. There are questions of pressing importance which it is very desirable should be elucidated on our own soil—questions that relate to our own medical topography—which are suggested by the vital statistics of our own population, and that have reference to the prevention or arrest of the march of epidemics along the routes of travel across the continent, which cholera, and more recently the epizootic, have pursued. Of primary importance, as bearing upon all the rest, will be the collecting and arranging of the vital statistics of the State, after the machinery shall be so amended as to make it work smoothly and continuously. This will not merely involve the simple process of registering births, marriages, and deaths, through the instrumentality of the civil authorities. There will still remain the difficult and responsible work of collating and analyzing the whole mass of facts. Tables alone, and without explanatory text, are almost entirely useless, because the majority of the people are not skilled in generalizing, and, if they were, could not make correct conclusions, for the want of a knowledge of the details of the work. Their practical value lies in the deductions; to arrive at which it becomes necessary to bring together certain facts to ascertain the results of such grouping, and in making deductions from these results, to notice all collateral or surrounding conditions, whether atmospheric, contagious, or any other. It is impossible for the executive officer of the Board to accomplish all this in a manner most useful to the State and creditable to the Board, without clerical aid, especially when the other duties attaching to his office are considered; the immense correspondence that has to be kept up; the time that is consumed in traveling; the monthly, (2) quarterly,

(1) Report of the Commissioner of Agriculture on the diseases of cattle in the United States; Washington, D. C., 1871.

(2) These are published regularly in the Pacific Medical and Surgical Journal.

and biennial reports that have to be prepared, and the requisite study of sanitary questions, of which the literature, already very extensive, is enlarging with rapid strides. (1)

It will be seen in the accompanying statement that the expenses of the Board have fallen within the limit granted by the State. We repeat that it is our intention so to manage the means placed at our disposal that the same results may always attend, while, at the same time, we would earnestly request, in consideration of the views just advanced, that the Contingent Fund be increased so as to enable the Secretary to employ the requisite clerical services. In turning to the report of the Massachusetts State Board of Health, after which all our other State Boards are modeled, the following items will be found among its other expenses for the year eighteen hundred and seventy-two, viz:

Chemical analyses.....	\$662 12
H. F. Walling, for report on lakes and ponds.....	325 00
Paid for special investigations to Wm. Riply Nichols and seven other experts.....	1,894 35
Total.....	\$2,881 47

In addition to the above expressly named "special investigations," which are of incalculable value, and would have been cheaply purchased by the State at a cost tenfold the entire appropriation, there were

(1) The *general duties* of a medical officer of health have never been more happily expressed than in an instructional minute issued by the General Board of Health of Great Britain in eighteen hundred and forty-eight. We quote that portion of the minute which relates to our present subject, making two or three necessary alterations within brackets. It runs thus:

"He will make himself familiar with the natural and acquired features of the place, with the social and previous sanitary state of its population, and with all its existing provisions for health, viz., with the levels, inclinations, soil [and humectation thereof, particularly in reference to level and variations of level of subsoil water], wells, and water-springs [and other sources of water supply] in the district [the quantity of the supply and the liability of the different sources to pollution]; with its meteorological peculiarities; with the distribution of its buildings and open spaces, paved or unpaved; of its burial grounds and lay-stalls [lay-stall meaning here, it is to be presumed, a place for the deposit of animal ordure and other refuse]; with the plan of its drains and sewers, and water supply; with the nature of its manufacturing and other industrial establishments; with the home accommodation of the poorer classes, and the facilities afforded them for bathing and washing; with the arrangements for the burial of the dead; and with the regulations in force for lodging houses and slaughtering places; for the cleansing of public ways and markets, and for the [deposit and] removal of [human ordure and other] domestic refuse. * * * He will take the best means in his power to become acquainted from week to week, and in times of severe disease, from day to day, with the deaths and sicknesses in his district; and he will inquire to what extent they have depended on removable causes. With the assistance of such subordinate officers as the local Board may empower him to direct and superintend, he will, without intermission, see to the wholesomeness of his district, taking care to bring its several parts under examination as often as their sanitary circumstances shall require; and especially observing those places which have previously given occasion of complaint, or been subject to sickness. He will inquire as to the cleanly, wholesome, and weather-proof condition of houses; as to their due ventilation and not overcrowded condition; as to the efficiency of their drainage and water supply; and as to the absence of dampness and offensive effluvia in and about them. He will examine, from time to time, the drinking waters of the place [and their sources where a running stream], and will observe whether provisions are offered for sale in any damaged or adulterated state, that is hurtful or illegal. He will occasionally visit all burial places, and see whether they give any ground for complaint; and he will habitually observe the slaughter houses of the district, and other industrial establishments which are liable to emit offensive (especially animal) effluvia."—("The Practitioner," July, 1873, p. 61.)

other expenditures, besides the fixed salary of the Secretary, which make the total contingent expenses per annum one third more than the total amount now asked for. We trust, therefore, that when it is further considered that the Secretary of this Board undertakes to compile, digest, and make available, for the purposes for which they were designed, the returns of births, marriages, and deaths, which is not done by the Massachusetts Board nor any other State Board of Health, but which, in every State where it has been resorted to, comes within the special province of the office of the Secretary of State, and involves a heavy item of expense for clerical and expert services, our reasonable request will not be denied.

Contingent expenses of the State Board of Health, exclusive of the salary of the Secretary, which is two thousand five hundred dollars per annum:

Rent of office from October 31st, 1871, to date.....	\$1,000 00
Traveling expenses of Secretary.....	450 00
Expressage and postage, etc.....	25 00
Traveling expenses of Henry Gibbons.....	280 80
Traveling expenses of L. C. Lane.....	187 20
Traveling expenses of Luke Robinson.....	90 00
Traveling expenses of F. Walton Todd.....	116 00
Total	\$2,149 00

Respectfully submitted, in behalf of the California State Board of Health.

THOS. M. LOGAN, M. D.,
Permanent Secretary.

SACRAMENTO, July 1st, 1873.

REPORT

OF THE

PERMANENT SECRETARY

TO

THE STATE BOARD OF HEALTH.



REPORT OF THE PERMANENT SECRETARY.

To the State Board of Health:

GENTLEMEN: In preparing for your acceptance and presentation, to the State Legislature, in accordance with our organic law and my duties as your executive, the accompanying report, I beg leave to submit the following reasons for the

METHOD THAT HAS BEEN ADOPTED.

The subjects that have come up for consideration at our regular meetings, and been committed to members of the Board for examination and elucidation, and most of which are within the special province of your Secretary, are so diverse and incongruous, that, to present a mere resume of our proceedings, would occasion considerable confusion, and so militate against that ready apprehension and clear conception of the various matters discussed, as to render obscure, if not nugatory, the information we wish to impart. Working as we do for the public, and writing, not for the professional, but the lay reader, it has been deemed most proper to connect those facts which lie sterile and disjointed as long as they remain diffused or scattered, under appropriate headings or groups, in as simple and perspicuous a manner as possible, so as not to interrupt the attention, or confuse the mind.

In arranging methodically such a digest, it was found necessary to interpolate very freely in order to render the sense clear and explicit, and in many instances to rewrite whole pages, and, in fact, to add entire articles like the one which is now placed first in order, as it is first in importance. All of which, it is hoped, will meet your approbation.

VITAL STATISTICS.

"An accurate basis of facts, derived from a sufficient amount of experience, and tabulated with the proper precision, lies at the very foundation of hygiene." ⁽¹⁾ As the importance of exact knowledge becomes better appreciated, statistics grow year by year more in favor with national, State, and municipal authorities, and thus has sprung into existence that great characteristic of modern civilization, State Medicine.

(1) Manual of Practical Hygiene, by Edmund A. Parker, M. D., F. R. S.

Men cannot now be well convinced on vital, social, and political questions, except they see the figures, or at least know that the statements which they receive are made by those who have seen them. Questions of life and death come more and more to be considered as mathematical problems, requiring a basis of facts from which to deduce correct conclusions; and the value of such conclusions is certainly very great, compared with the common opinion formed, as it must be, by guess from uncertain data.

As no business can be successfully or properly conducted without a carefully kept system of accounts, so it cannot be justly said that a community or State can reasonably expect to be prosperous without being fully posted as to the condition of all its interests and of all the influences affecting them. "Except by means of statistics, we cannot, with any degree of certainty, know whether, over a given disease, we are gaining or losing control—whether even the general result of our efforts is better or worse than in times past. The common opinion may be that the race is degenerating—that the average age of man is decreasing; but without statistics the truth or falsity of such opinion cannot be known. In no other way can be shown the influence on mortality of climate, sex, occupation, and different social states, and of various other conditions, which, when known, may be avoided." ⁽¹⁾ Hence, statistics commend themselves to the whole community—the non-professional, as well as the professional. Impressed with these views, and believing that any source of intelligence, which shows the physical, moral, social, and sanitary condition of a people, is of the most vital importance to every government, and that the registration of births, marriages, and deaths, and the causes of death, will show these conditions most effectually—the more so, as it has been found by our past experience that no reliable statistics can be procured, to any considerable extent, by voluntary efforts alone—we recommended, in our last report, the aid of laws to accomplish this object. Accordingly, the last Legislature wisely adopted a system of registration, to be found in Title VII, Chapter III, of the Political Code. ⁽²⁾

This Chapter accords virtually with the Political Code of New York, and the laws of other States, which are now in successful operation. California once had a statute, which, to a certain extent, your Secretary was instrumental in having enacted; but the machinery proved so cumbersome and expensive, that the Registrar, who succeeded in getting the appointment, finding there was no fortune to be made by his office, had it repealed in the second year of its existence, and by this reckless, vandal legislation, caused an irremediable loss to accrue to the State.

The present law is economical—more so than that of any other State in the Union—and is well calculated to supply a deficiency which should long ago have been rectified. That it has not worked smoothly and perfectly since it went into operation, on the first of January last, is not due so much to the failure of providing for a more liberal distribution of all the requisite blank forms, with fuller instructions and other facilities, which it is now proposed to correct, as to our imperfect civilization, to our ignorance, or rather ignoring of the very conditions of

(1) Third annual report of the State of Michigan, relating to the registry and return of births, marriages, and deaths, for the year 1869.

(2) An abstract of all the laws, relating to the public health, will be found in the Appendix, in order to facilitate ready reference, particularly in making requisite amendments, and also for the more general diffusion of the knowledge of these laws.

a high social state and of healthy life. The minds of the leading men, as well as of the masses, are so absorbed in mining speculations, in commerce and the arts, agriculture and politics, that it is almost an impossibility to turn them aside, and secure their attention and action upon a subject, whose results, however good and necessary for the progress of the race, are so remote, as those of vital statistics. They deem it better to transmit to posterity an account of stocks and merchandise than the births of their children; more important to record the losses, by failure of crops and by destruction of herds, than by the deaths of their fellow citizens. Fortunately, however correct may be the general opinion with regard to the "paternal theory" of government, as regards the fostering care of agriculture, commerce, and all the arts of peace, there can be but little diversity of view, among the enlightened, as to the necessity of the same provident care of the State being extended into the field of human life, to encourage and watch over and protect the vital machinery of man, by which all other interests, public and private, are created, sustained, or made of any value.

In that remarkable series of novels, by which a Prime Minister of England sought, and successfully, to mold and educate a nation, there are no more pregnant truths than these:

"It is the first duty of a State to attend to the frame and health of the subject."

"The fate of a nation will ultimately depend upon the health and strength of the population."

"To elevate the physical as well as the moral condition of the people, was one of the purposes, and not the least important, with which D'Israeli entered into public life. The Public Health Act, Food Commissions, innumerable sanitary associations, and the active support of the Government in all questions affecting the health and strength of the population, are the results of his life and labors." (1)

That our own statesmen have turned their attention in the same direction is full of promise; and when we reflect that a healthy, able-bodied, adult population is, in truth, "the State," we begin to realize the scope and intent of the laws in question, which are calculated to inform us how near the population approaches that standard, and whether it enjoys all that the natural and organic law offers it the means of possessing and using.

"For, if analyzing the body politic, as it actually is, and taking an account of the vital and productive force that it now possesses and wields, it be discovered that there are depreciations of life and power, then the Legislature will learn what and how great these are; whether they grow out of the essential conditions of our terrestrial existence, or whether they, or any part of them, may be modified, diminished, or prevented by any State action, or by any intelligence and coöperation which may be enlisted and authorized for this purpose."

In whatever aspect this subject is viewed, its magnitude and importance surprise us; and the indifference with which it is treated by men

(1) Hygiene, Vol. I, No. 1, January, 1873.

of intelligence—even members of the medical profession—surprises us still more.

Let us look at some of the results of registration, from the practical, money point of view, so clearly put by that American Nestor of vital statistics, Doctor Edward Jarvis, from whom I have just quoted. Doctor Farr, the reliable administrator of the registration law in England, estimates the national value of a common laborer, twenty-five years old, at (two hundred and forty-six pounds seven shillings, or,) one thousand two hundred and thirty-one dollars and seventy-five cents. At a low estimate, it costs not less than fifty dollars a year, on an average, for the support and education of children from birth to maturity. Every child then is worth to the State fifty dollars, multiplied by as many years as he has lived; and, consequently, the death of every one under fifteen years old, is a loss of that amount to the State. In this way the public or national loss, by early mortality, may be easily estimated. In the United States census of eighteen hundred and seventy, I find that there died in California, two thousand two hundred and seventy-five male, and one thousand nine hundred and seventy-six female children, making a total of four thousand two hundred and fifty-one children and youth under the age of fifteen. These had lived an average of two years, eight months, and seven days each, or a sum of eleven thousand four hundred and twenty-seven years in all. At fifty dollars a year, (1) which is a very low estimate for California, they had cost their families or the community, five hundred and seventy-one thousand three hundred and fifty dollars, for their maintenance, which must be charged to the general income of the State; and so much was lost by their premature death.

This is the mere money value of the unskilled labor of these children, had they lived. But they are possessed of another value, that is incapable of expression in terms of dollars and cents. Their brains, directing their labor upon the rich natural resources of our State, would in a few years produce results to which no definite value can be assigned; while the talents of the more gifted, developed under the liberal provisions of our State University, would prove an invaluable leaven in the civilization of California.

Now, the number of children in a community is always referred to as an evidence of general prosperity, and in as far as they are to grow up and contribute to the force and capital of the State, they certainly are indications of future strength and prosperity. But in as far as they are to die before they reach the fullness of their development, they are an evidence of weakness, and a burden, and a tax on public force and wealth. Looking, then, at these laws from a politico-economical point of view, it would seem that, independently of the very great advantage the State would derive from a faithful executed system of registration, the ability to determine, clearly and distinctly, the relative fecundity and mortality of its population; the relative proportion of the sexes among its citizens; the longevity of the people; the causes of death within its borders; the weight with which each cause of death presses upon different portions of the community—whether those portions be considered in relation to age, sex, or condition of its people, or in relation to different sections of its territory, and of many other benefits—it would also prove highly

(1) This is the amount appropriated annually from the State Treasury for the support of every orphan, in the different asylums.

profitable to be able to compare these conditions of the inhabitants, with those of other State and countries. Nor should such measures be resorted to decennially only, as is now partially and imperfectly done by the United States census, but annually, to meet the urgent demands of progressive civilization.

In order to make these comparisons correctly and with satisfaction, it stands to reason, that the basis upon which the specific information, derived from different States and countries, connected with the three great events of human life, should be essentially the same, and that it should be arranged and printed in such form and manner, that deductions may be readily drawn, setting forth, in reliable and positive terms, the real sanitary condition of the people, the progress of population, and the law of mortality in each State and country.

Actuated by these considerations, and urged on by the progressive members of our National Medical Association, which assembled in San Francisco in eighteen hundred and seventy-one, I submitted the following preamble and resolutions for the consideration of that enlightened body, which represents the medical profession of the United States.

A NATIONAL HEALTH COUNCIL.

WHEREAS, The science of hygiene and its corollary preventive, or State medicine, are subjects eminently congenial with the purposes of this association, inasmuch as they have for their objects the preservation of human life, and the removal of those causes of disease and death, which it is in the power of legislation to ameliorate, if not eradicate; and, whereas, the great fundamental idea that was made the prominent element for medical association, and that led eventually to our National organization, was a higher standard of medical education; and, whereas, the present system adopted by our colleges provides more and more satisfactorily for the thorough qualification of the graduate, as regards the principles and practice of his art, but does not provide at all adequately for the special study and cultivation of questions of State medicines, therefore, be it

Resolved, That this association recommends a distinct and separate chair of hygiene, independent of physiology, to be established in all our medical schools, and constituted a requisite curriculum preliminary to that diploma which confers one of the highest honors of the profession.

Resolved, That the inauguration of the enlarged philanthropic policy of State medicine in Massachusetts and California, is worthy of our special approbation, and commends itself to other States for imitation; and, therefore, the President of this association is hereby authorized to nominate at this session a committee, consisting of one physician from each State in the Union, to memorialize the Legislatures of all the other States to follow the example of one of the oldest, most enlightened, and conservative, as well as one of the youngest, most progressive, and enterprising members of our glorious confederacy, who have led off in the right way, and at the right time, for the prevention of disease, and the correction of "those multitudinous agencies, whether physical, whether moral, whether born of earth, of air, or of society, which are either openly or insidiously degenerating the human race."

Resolved, That this association further recommends that initiative steps be taken, as soon as six States shall engraft State Medicine upon their statute books, for the formation of a "National Health Council," whose objects shall be the prosecution of the comparative study of

international hygienic statistics, and the diffusion and utilizing of sanitary knowledge; and that said Council shall be aided and assisted by this association, in using whatever influence may legitimately lay in their power, with foreign States, as well as with the medical profession and people generally, in securing coöperation in the ends and objects of public hygiene.

Resolved, That said National Health Council, although thus organized as a branch *per se*, shall be auxiliary to this association, and shall constitute a special section on hygiene, to which all questions, germane to this department of medicine, shall be referred. "Only," to use the language of the great Virchow, "by thus working harmoniously together, by thus mutually enlightening each other, will the State gain an organ to which may be safely intrusted the solution of the great question of our time, viz: bodily and mental health, and development of future generations."

These resolutions were unanimously adopted, and a committee, composed of one physician from every State, was accordingly appointed. As Chairman of the committee, I rendered the following report at the next annual meeting in Philadelphia:

"The Chairman of the Committee on 'A National Health Council,' in conformity with certain resolutions adopted at the last meeting of the association, respectfully reports:

"That the initiative was taken by first transmitting a circular to each of the thirty members of the committee, representing as many States, informing them of their appointment, and of its nature. Upon the receipt of a favorable response from most of the committee, a form of a memorial was prepared, printed, and mailed to each, with a view of bringing about a concerted movement in every State in regard to such legislative action as the subject seemed to require.

"While your committee are not yet able to give any definite results of their action, still we report progress, and can confidently state that, although the requisite number of States have not yet conformed to the resolutions we were appointed to carry out, nevertheless a general interest has been awakened throughout the length and breadth of our common country, in the great questions therein involved. To no better evidence in proof of this assertion can we point than to the recent message of the Governor of this great State wherein we are now assembled—the 'Keystone' in the sublime arch, crowning the unity alike of our Republic and of American Medicine. In the broad, statesmanlike views therein enunciated, the immense power for good is clearly recognized, which resides in the State, and which can only be exercised by the State in promoting those healthful influences and bringing into play all those forces of sanatory science which are capable of counteracting the evils which civilization brings in its train. For while private enterprise is hastening after the acquisition of wealth, and applying all the resources of science in its production, so also should recourse be had to science by the State for protection against the evils which the hurtful, because selfish, spirit of enterprise is continually engendering. And so clearly defined are now the methods by which these conditions can be fulfilled, that we may safely measure the real rank which a State holds in the scale of civilization, by the attention it bestows on public hygiene.

"It would be out of place, neither is it conceived necessary for your

committee, at this time, to reinforce the enlightened representatives of our profession here assembled with reasons, beyond those with which they are all already familiar, for more active endeavors in the sanative field of science. The facts and deductions that from year to year have been so ably and so clearly pressed upon your attention by means of the able reports on medical topography and vital statistics recorded in our transactions, point unmistakably to the close relationship between rational medicine and sanitary science. They illustrate, either by figures or facts, the sad ravages from premature death upon whole communities by preventable diseases—the result of non-conformity to the laws of hygiene. They show that the diseases bred of malaria are rife among us. They point to the pallid, tuberculous artizans of our overgrown cities; to their slaughtered infants; and to the unhappy fallen women, and the demons of debauchery, who meet us at every turn.

“Now, no amount of individual effort or of medical skill can do what is wanted in the premises. Earnest, combined action, not only in but out of the profession also, is what is wanted to secure to the great masses of the people the first conditions of a sound sanitary state; to arrest the propagation of infectious disorders; to prevent over-crowding in dwelling houses, and over-tasking in schools and manufactories; to furnish an adequate supply of fresh air and potable water, and otherwise to provide against the new dangers to health and to life which the progress of population, consequent upon the increase of wealth, is continually introducing. Without extrinsic aid, however, it is believed that we can effect comparatively but little. The influence and moral power even of medical men are limited, and it is in fact impossible for those in large practice, with all the anxieties which such practice necessarily entails, to give to questions of a public nature the time and consideration their importance demands. What seems to be required, therefore, to meet the necessities of the case, is a thoroughly well organized department of health, connected with Government, under the surveillance of this association, and charged with the duty of superintending a sanatory system, to which our Municipal and State Boards of Health shall be subsidiary, just as our county and State societies are to this organization.

“Through the instrumentality of such State Boards of Health as now inaugurated in Massachusetts, California, Minnesota, and Virginia, a body of medical men will be provided for, who will thus be enabled to withdraw from the engrossing demands of private practice, and to devote themselves to the special study of sanitary questions; and in order to secure a constant supply of competent physicians to this end, there should be instituted in our medical schools full and complete courses of instruction in State medicine.

“As the phrase “State Medicine” is perhaps imperfectly understood by many of the profession, and is absolutely new to the general public, we would here parenthetically, to give an idea of what it is, quote the list of subjects which have been suggested as properly appertaining to it by a committee of the General Medical Council of Great Britain. They are: Forensic Medicine, Toxicology, Morbid Anatomy, Psychological Medicine, Laws of Evidence, Preventive Medicine, Vital and Sanitary Statistics, Medical Topography, and certain portions of Engineering Science and Practice. In short, as a member of the committee well expresses it, State medicine consists in the application of medical knowledge and skill to the benefit of communities; which is obviously

a very different thing from their application to the benefit of individuals in private or curative medicine.

"The course of lectures to which we have just referred, might be open for the instruction of the public generally, and particularly school teachers, trained nurses, and sanitary inspectors. This proposition can the more easily be acted upon because our knowledge of the whole subject is now not only sufficiently advanced and possessed of scientific accuracy, but is also of a character that lends itself with peculiar facility to popular exposition. One great difficulty which officers of health experience everywhere, is, that they rarely obtain official information of epidemic disease, even in their own districts, until they see deaths registered against it, when it is obviously too late to adopt measures for prevention. Now, if the intelligent coöperation of the laity was secured, not only would the obstructive effects of present ignorance and apathy, to a great extent, be got over, but, by wise and active combination, we would be enabled to crush out, in their very incipency, those fearful infections which become almost uncontrollable if not checked in their onset. There is no longer any doubt but that, whatever may be the vagueness of our conjectures or the strife of our controversies respecting the real nature of contagion, of air poisons, or of marsh miasm—be they organic germs, capable of indefinite multiplication or proliferation, when once imbedded in an appropriate nidus, or be they new combinations of proximate principles generated out of death, decay, and disintegration—sanitary science has, either by making their habitats untenable and incapable of maintaining their noxious life, or by chemically decomposing them as morbid matter, in many instances disarmed them of their terrors.

"Typhoid fever offers, perhaps, the most striking illustration of this position. Not only is the law of its propagation perfectly understood, but the excreta by which almost exclusively its deadly germs are sown throughout society, are, on their issue from the body, entirely within our control. To disinfect these excreta has been found almost infallibly to prevent the fever from spreading. The same may be said in regard to Asiatic cholera. The subtle and volatile poison of scarlatina is disarmed of its virulence, by guarding against its desquamative scales during convalescence. The limitation of diphtheria, by precautions of a similar nature, in well ordered households at any rate, is a matter of the greatest certainty.

"Diffuse the discovery of the means of protection against these and many other diseases which have been perfected under the vigilant outlook and investigation of combined chemical and microscopic detectives; extend what has been successfully applied to circumscribed communities to States and to Nations; let facilities for concerted action be established internationally through the instrumentality of Governments, and the people will no more be decimated by those pandemic waves which have so often swept with cumulative impetuosity over the face of the earth. Utopian as the idea may at first sight appear, of stamping out the great anti-sanitary evils which beget disease, still it would be taking a very limited view of the power of the human mind, and argue a strange obliquity of vision as to the lessons its triumphs in other fields are every day teaching us, to doubt our ultimate ability to do so. 'That man, who is rapidly subduing all the most Titanic forces of the universe to his commonest uses, should always remain at the mercy of

these ignoble things, is an antithesis too extreme to be permanent.'⁽¹⁾ The Government of the United States has already done something in the direction toward which these suggestions tend, by the establishment of a Bureau connected with the War Department, which makes constant synopses of the weather, storm currents, and other meteorological phenomena occurring in some of the most prominent parts of the Union. Let the operations of the 'Signal Service' be so extended as to reach the remotest expansions of the Republic; and while there shall be sent from the capital of every State and Territory full telegrams of the daily travail of nature in all her parts to the federal head, let the respondent wire report back simultaneously everything of scientific interest to the physician as well as to the physicist.

"The important results that will follow when this labor of devotion to science shall be taken up and carried out from America to Europe, and the two continents made to exchange their daily records of disease and weather reciprocally, may be imagined, but cannot be conceived in their illimitable applications. Not only will storm-currents be indicated hours, if not days, in advance of their actual presence, but all the meteoric and other phenomena attendant upon the appearance of diseases will be noted and heralded, so that the progress of the latter may be combatted in their small beginnings, before they gain a foothold in the land;—and thus, while from the concomitant observations of an expanded horizon the origin and advance of epidemics will be made more apparent than they now are, so will their latent relationship to some great cosmic or telluric laws be probably discovered.

"It is peculiarly fitting for us, who glory in the fame of our Franklin and our Morse; it is due to our own share, as Americans, in that fame, and to our own interests in the great results to the world of their grand inventions, that we should be the first to establish such systems of intercommunication as they have rendered practicable among ourselves and among the nations of the world, as will lead to a strictly correlative achievement in putting the plagues of nature under our feet, by the subjection we possess of the powers of nature to our will.

"In conclusion, your committee respectfully ask to be continued, and to constitute a special section on 'State Medicine and Public Hygiene,' to which all subjects cognate thereto may be referred. Also, that they be empowered to take such action, in connection with the authorities at Washington, as in their judgment may be deemed expedient in carrying out the objects of the resolutions."

With the exception of the last sentence, my report—as above—was also unanimously adopted, and the committee continued. Before the expiration of another year, the professional interest in this question had increased to such a degree, and the store of collateral information had become so accumulated and urgent, that a general awakening of the public mind resulted throughout the whole United States in favor of the proposed scheme. In evidence of this, I can, not only point to the organization of a Public Health Association by leading scientific, as well as medical men, and to the recent introduction, in the last Congress, of a bill for the establishment of a National Sanitary Bureau, approved by said Public Health Association, but also to the organi-

(1) Dr. William Budd, of England, many of whose forcible thoughts have been adopted in this report.

zation of a special section on Public Hygiene and State Medicine, and the adoption of the following resolutions at the late meeting of the National Medical Association, in May last, in St. Louis:

"Resolved, That in the judgment of this association, the establishment of a National Sanitary Bureau, with relations to the General Government similar to those of the Bureaus of Agriculture and Education, is highly desirable as a means of promoting sanitary science and the protection of the public health.

"Resolved, That this association request of the United States Educational Bureau to so extend the scope of its inquiry as to include vital, disease, and mortuary statistics in relation to local, meteorological, and geological influences, and to disseminate the information so collected throughout the country."

The following is the bill referred to for the establishment of a National Sanitary Bureau:

"FORTY-SECOND CONGRESS—THIRD SESSION.

"In the Senate of the United States, December thirteenth, eighteen hundred and seventy-two, Mr. Patterson asked, and by unanimous consent obtained leave, to bring in the following bill, which was read twice, referred to the Committee on Education and Labor, and ordered to be printed—'A Bill to Establish a Bureau of Sanitary Science.'

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be established, at the seat of government of the United States, and attached to and under the direction of the Department of the Interior, a Bureau, to be denominated a 'National Sanitary Bureau,' the general design and duties of which shall be to acquire and diffuse among the people of the United States useful information on subjects connected with the preservation of the public health, and to aid in the establishment and management of efficient sanitary and quarantine systems and regulations throughout the several States and Territories of the United States.

"Sec. 2. That there shall be appointed by the President of the United States, by and with the advice and consent of the Senate, an officer, to be known as the Commissioner of the National Sanitary Bureau, who shall be the chief executive officer of said bureau, and who shall receive for his compensation a salary of ——— dollars per annum.

"Sec. 3. That it shall be the duty of the Commissioner of the National Sanitary Bureau to acquire and preserve in his Bureau all information which he can obtain by means of books and correspondence, and by practical and scientific experiments (accurate records of which experiments shall be kept in his office), by the collection of statistics, and by every other means in his power, concerning the following subjects:

"Medical geography, including climates, marine or littoral, upland or inland, mountain; their diseases, including thoracic and glandular zone, intermittent zone, gastric zone; hydrology, including saline, alkaline, chalybeate, hot springs.

"Diseases of animals and cereals, including cattle plague, rot in sheep, cerebro-spinal meningitis in horses, rust in wheat, potato rot, rye and corn fungi, with soil analysis.

"Diseases of artisans from indoor confinement, over-crowding, and

absence of sunlight; from contaminated atmosphere by mechanical impurities (cotton, wool, dust, and so forth); from chemical impurities (mechanical vapors, arsenic, phosphorus, lead, and various pigments); diseases of other callings and professions.

"Certain zymotic diseases, including typhus, scarlatina, rubeola, their causes and prophylaxis.

"Smallpox, cholera, yellow fever, including causes, prophylaxis, or modification; investigations of all questions bearing upon vaccination as a preventative or modifier of smallpox; the adoption of suitable means of procuring, preserving, and distributing to physicians and public institutions, free of charge, vaccine matter of unquestioned purity; the investigation of cholera and yellow fever, their causes and prevention; and the collecting, digesting, and distributing information on these subjects.

"The registration of mortuary statistics, including color, sex, race, and so forth.

"The causes of disease, including the nature of disease-germs, aerial, animal, and contagious.

"The best means of preventing the ingress of foreign epidemics, and of extending aid to State quarantines.

"The proper sanitary condition of various modes of public conveyance on land and water.

"Sewerage, and nuisances in general.

"Proper sanitary regulations as to the transportation of persons afflicted with contagious diseases

"The sanitary condition of public schools, hospitals, charities, manufactories, and so forth; and proper regulations for the preservation of health therein, including hours of study in proportion to age, air-space, ventilation, heat, light, vaccination, and so forth.

"Unwholesome food and drink, with the means of preventing and correcting the use of the same.

"Chemistry, microscopy, mechanics, in their relations to various subjects of investigation.

"The collection of a library for said Bureau to consist of standard works on all subjects of public hygiene; reports of Boards of Health, Superintendents of quarantine, public officers, and others, on sanitary matters, pamphlets essays, original papers, and so forth.

"SEC. 4. That it shall be the further duty of the Commissioner of the National Sanitary Bureau to make annually a general report, in writing, of his acts, to the President and to Congress, in which he may recommend the publication of papers, part of, or accompanying his report; to make special reports, on particular subjects, whenever required to do so by the President or either House of Congress, or when he thinks the public necessity demands it; to direct and superintend the expenditure of all moneys appropriated by Congress for the support of said Bureau, and render full and accurate reports thereof; and the said Commissioner may send and receive through the mails, free of charge, all communications and other matter pertaining to the business of his office, not exceeding in weight thirty-two ounces.

"SEC. 5. That there shall be appointed for duty in said National Sanitary Bureau, whatever additional officers are required, including a chief clerk, chemists, experts, and so forth, whose salaries shall be ———, and who shall, together with the Commissioner, give bonds for the faithful performance of their duties."

Without assuming to pass judgment upon this particular bill in all its provisions, which failed in its final passage, its scope and intent are, at least, to be commended. As recited therein, the general design and duties of the National Sanitary Bureau shall be to acquire and diffuse among the people of the United States useful information on subjects connected with the preservation of the public health, and to aid in the establishment and management of efficient sanitary and quarantine systems and regulations throughout the several States and Territories. That it has failed to become a feature of our National Administration is due, for the most part, to the little general interest it possesses for politicians, and to the lack of active efforts in divulging the facts bearing upon its elucidation. Meanwhile, the organization of a special section, consisting of one member of the American Medical Association from each State in the Union, on Public Hygiene and State Medicine, is an accomplished fact. Composed, as it is, of gentlemen specially devoted to sanitary studies, and to the practical application of public hygiene, and numbering among its members a majority of the sanitary Superintendents, Secretaries, and other officers of Boards of Health, of cities and States, it is eminently qualified to discuss intelligently, and settle all questions relating to science, policy, and modes of work, and thus secure harmony and coöperation. As a legitimate sequence of growth from their action, a Central Bureau, at Washington, will become a necessity.

Instead of being a mere adjunct to the Department of the Interior, there seems no good reason why such a bureau should not, before long, be erected into an independent department, second in its influence and importance to none other. Let us have a Secretary of Public Health, as well as a Secretary of War. The achievement of this great national undertaking, as of every other great and good work among men, can only be effected by time and patience, by rational inquiry, and enlightened perseverance. Until this is accomplished, each State must form a plan for the gathering of its own vital statistics, suited to its own circumstances, and must use for this purpose the means it may possess, and the machinery already in operation.

California has adopted a system of registration which, it was supposed, would be best suited, in an economical point, to its internal organization, and domestic and social regulation. In another part of this report, as already stated, will be found the Chapter containing the laws referred to, with such suggested amendments as experience has shown to be necessary. But, although the plan of gathering these statistics may be different in each State, there has not been, in our instance, nor need there ever be, any variation with regard to the arrangement of the mortality statistics. One uniform classification of diseases has been recommended by the American Medical Association, and the form resorted to in the compilation of this report, conforms in all essential particulars with the nomenclature, which the census tables—that have been used as a standard for reference and comparison—completely exemplify. By means of the commendable coöperation of the members of the medical profession in various parts of the State—whose names will appear in Table No. 1—I am now enabled to supplement, for such as it was expected would be furnished through the instrumentality of the registration laws, the following

Idiogram

Showing per cent of Mortality by

CONSUMPTION

From July 1871 to June 1872 inclusive

In proportion to the total population

San Francisco
Sacramento
Petaluma
Stockton
Marysville
Placerville
Auburn & Surr^{dgs}
San Diego Coun
Oroville & Surr^{dgs}
Woodland
Oakland
Los Angeles
Truckee & Surr^{dgs}
S^t Helena & Sur
Napa City
Watsonville
Folsom & Surr^{dgs}
Bridgeport T.
Santa Barbara
Redwood City
Trinity Co.
Monterey
Santa Cruz
Suisun & Fairfiel
Colusa & Surr^{dgs}
Dixon & Surr^{dgs}

INDICATOR

Showing per cent of Mortality by
CONSUMPTION

From July 1871 to June 1872 inclusive

In proportion to the total population
 in 26 Localities in

CALIFORNIA U.S.

1 per C.

1 per C.

$\frac{3}{4}$

$\frac{3}{4}$

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{4}$

$\frac{1}{4}$

None

None

San Francisco

Sacramento

Petaluma

Stockton

Marysville

Placerville

Auburn & Surr^{dgs}.

San Diego County

Oroville & Surr^{dgs}.

Woodland

Oakland

Los Angeles

Truckee & Surr^{dgs}.

S^t. Helena & Surr^{dgs}.

Napa City

Watsonville

Folsom & Surr^{dgs}.

Bridgeport T.

Santa Barbara

Redwood City

Trinity Co.

Monterey

Santa Cruz

Suisun & Fairfield

Colusa & Surr^{dgs}.

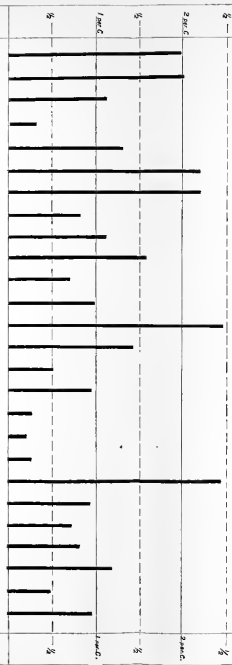
Dixon & Surr^{dgs}.

San Francisco
Sacramento
Petaluma
Dixon & Surr^{dgs.}
Stockton
Marysville
Placerville
Auburn & Surr^{dgs.}
San Diego County
Oroville & Surr^{dgs.}
Woodland
Oakland
Los Angeles
Truckee & Surr^{dgs.}
S^t Helena & Surr^{dgs.}
Napa City
Watsonville
Folsom & Surr^{dgs.}
Bridgeport T.
Santa Barbara
Redwood City
Trinity Co.
Monterey
Santa Cruz
Suisun & Fairfield
Colusa & Surr^{dgs.}

From July 1871 to June 1872 inclusive
 To the total pop- in 26 localities

INDIAN
 Showing per cent of
MORTALITY

INDIGENES
 Showing per cent of
MEXICANITY
 From July 1871 to June 1872 inclusive
 To the total pop- in 26 localities
CALIFORNIA.



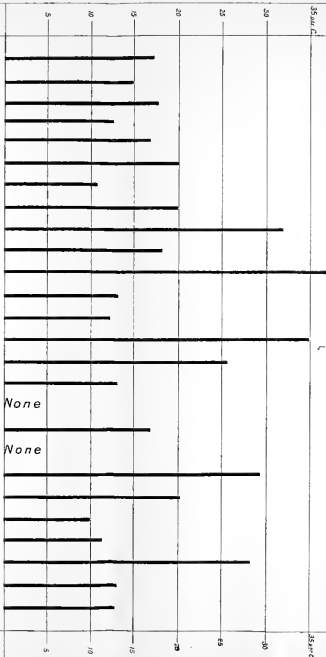
San Francisco
Sacramento
Petaluma
Dixon & Surr^{dgs.}
Stockton
Marysville
Placerville
Auburn & Surr^{dgs.}
San Diego Count
Oroville & Surr^{dgs.}
Woodland
Oakland
Los Angeles
Truckee & Surr^{dgs.}
S^t Helena & Surr
Napa City
Watsonville
Folsom & Surr^{dgs.}
Bridgeport T.
Santa Barbara
Redwood City
Trinity Co.
Monterey
Santa Cruz
Suisun & Fairfiel
Colusa & Surr^{dgs.}

Diagram showing per cent of CONSUMPTION to
 Total No of deaths in 26 localities in CALIFORNIA
 From July 1871 to June 1872.

35 per C.

35 per C.

Diagram showing per cent of QUANTIFICATION to
Total % of deaths in 26 localities in CALIFORNIA
From July 1871 to June 1872.



MORTALITY STATISTICS.

Pursuing the plan adopted in our last biennial report for eighteen hundred and seventy and eighteen hundred and seventy-one, I have prepared similar tables for the succeeding twelve months, illustrated by diagrams and maps, (1) showing, as completely as it is possible to do under existing circumstances, the death-rate in twenty-six of the principal cities and towns of the State, as well as the total mortality from all causes, and from certain principal diseases severally and in groups, with the proportion to deaths from all causes, and to population—*i. e.*, the prevalency and fatality of certain diseases.

It is a cause of much satisfaction to find that the results thus obtained are, for the most, confirmed and verified by the census, which affords the material for determining the death-rate, and of making other deductions more completely and accurately than our own fragmentary statistics. Many important conclusions may now be derived with more assurance from these sources, collectively, notwithstanding the imperfect condition of our own data, and our inability to apply, as skillfully as has been done in the instance of the census, the power of science, by reconstruction and reconstitution, in supplementing the missing parts and restoring the lost links of connection.

(1) The maps have been compiled from the United States Census, 1870.

TABLE No. 1.

Showing the total mortality, as well as that by the most prevalent diseases, in twenty-six localities, comprising nearly half the population of the State, with the ratio of deaths to one thousand of population, from July, eighteen hundred and seventy-one, to June, eighteen hundred and seventy-two, inclusive; also, the authorities for the data.

LOCALITIES.	Population	Total number of deaths.....	Ratio of deaths per one thousand of population	PREVALENT DISEASES.						AUTHORITIES.
				Consumption	Other diseases of lungs..	Diseases of stomach and bowels.....	Diphtheria	Scarlatina.....	Typho-malarial fevers..	
San Francisco.....	150,351	2,998	19.9	511	238	181	26	16	186	..San Francisco Board of Health.
Sacramento.....	16,298	331	20.4	47	29	23	3	2	11	....Sacramento Board of Health.
Petaluma.....	3,514	41	11.7	7	1	5	.....	.....	3	.....G. W. Graves, M. D.
Dixon and surroundings.....	5,000	16	3.2	2	5	1	.....	.....	.....	.....R. H. Plummer, M. D.
Stockton.....	10,033	131	13.1	21	6	28	1	2	2	.....Stockton Board of Health.
Marysville.....	4,375	97	22.2	20	10	6	.....	.....	15	.....C. E. Stone, M. D.
Placerville.....	1,562	34	21.7	4	.....	3	.....	.....	5	.....E. A. Kunkler, M. D.
Auburn and surroundings	2,500	15	6.0	4	1	2	.....	1	1	.....A. S. Dubois, M. D.
San Diego County.....	4,957	56	11.3	18	1	9	.....	.....	2	.....County Medical Society.
Oroville and surroundings	1,500	18	12.0	4	8	1	.....	.....	2	.....J. M. Vance, M. D.

In the above table (No. 1) is shown as completely as it is possible to do under existing circumstances, the death-rate in twenty-six of the principal cities and towns of the State, as well as the total mortality by all causes in these localities, and the deaths and percentage of deaths by some of the most generally prevalent diseases. The population of these cities and towns, in several instances, has been put down in accordance with the estimate of the population within the radius of the practice of the medical gentlemen furnishing the monthly reports of mortality, but, for the most part, it is taken from the late United States decennial census, and amounts in the aggregate to two hundred and sixty-one thousand seven hundred and fourteen, or nearly half the population of the State; and the ratio of the total number of deaths per one thousand is 17.1; or one death to every fifty-eight persons. The twelve months covered by the tables reveal a total mortality of only ninety-two and a half per cent of the preceding year (which was also a very healthy season), notwithstanding the annual increase of population, and are thus proved to have been the most favorable, in a sanitary point, since the American settlement of the country, and will constitute a standard of comparison for determining the health status of the State and of these localities for all coming time. It is further demonstrated, by the variation in the death-rate of these different localities, that different causes are at work; and in the search for these and their remedies we proceed from the general to the special—from the numbers of deaths in the year to those by months; also, the sex, race, age, and nativity, as may be seen in the accompanying table.

The large disproportion of the sexes is the first feature in Table No. 2 that strikes attention—there being more than twice as many deaths of males as females; seventy-three per cent of the former, and twenty-seven per cent of the latter. This ratio prevailed to a much greater degree formerly, owing to the great rush of male adventurers without their families, who were supposed to be better able to endure the hardships of immigration into a new country. By referring to Table No. 3 compiled from the United States Census, it will be seen that about the same disproportion obtains in all the new States and Territories. Still the ratio of deaths for males continues decidedly in excess of that for females; for the males comprise about sixty-two per cent of the population, and, as first stated, seventy-three per cent of the deaths are of males. It would naturally be supposed that with his more vigorous frame and sturdier make, the vitality of the male would be greater than of the female, his average life longer, his greatest age greater. That it is not so, however, is a problem which science has not yet solved. This law of population holds good in every country of which we have any statistics; about five per cent more males than females are born, but at five years of age more girls are alive than boys. Again, at every period of life, the "expectation of life," as insurance companies term it—that is, the average term yet to live—is greater in women than in men. And finally, of very old persons, the large majority are women. So true is this, that the last census of France shows that at the age of ninety years, there were three women to two men, and at the age of one hundred, the number of women was more than sixteen times the number of men. ⁽¹⁾

In the following table, which has been abstracted from the United States Census, for the purpose of affording a comparative view of the mortality of every State and Territory, with distinction of sex, it will

(1) George H. Naphey's *Counsels on Nature and Hygiene*.

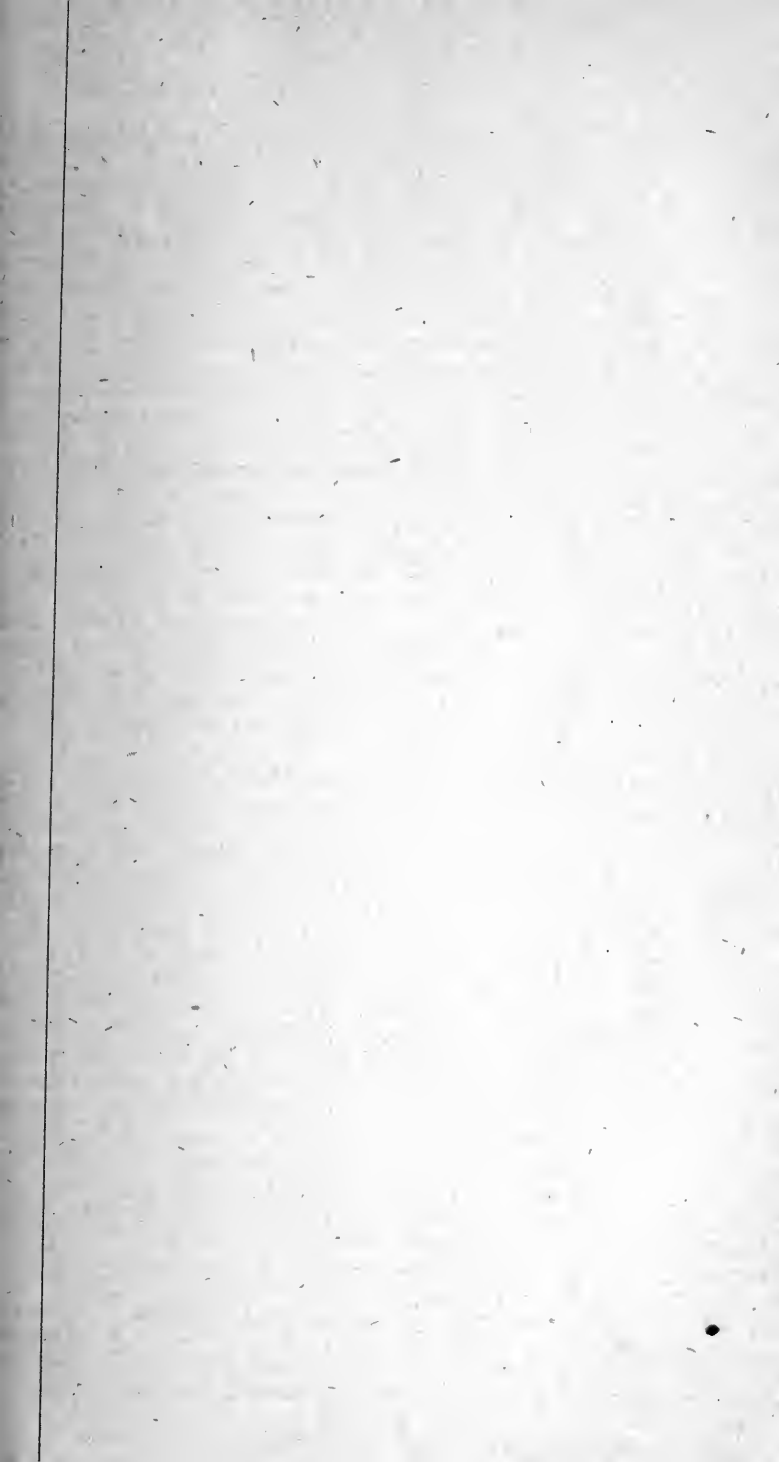


TABLE No. 2.

Showing the total mortality from July, eighteen hundred and seventy-one, to June, eighteen hundred and seventy-two, inclusive, by sexes, race, months, ages, and nativities.

CITIES, TOWNS, Etc.	Total deaths	SEX.		RACE.		MONTHS.												AGES.										NATIVITIES.					
		Male	Female	White	Copper	Black	July	August	September	October	November	December	January	February	March	April	May	June	Under one year of age	One and under five years	Five and under ten years	Ten and under twenty years	Twenty and under thirty years	Thirty and under forty years	Forty and under fifty years	Fifty and under sixty years	Sixty and under one hundred years	Unascertained	Pacific States	Atlantic States	Foreign countries	Unascertained	
San Francisco	2,998	2,007	991	2,591	359	48	230	247	248	300	288	245	226	213	256	255	263	247	655	283	75	114	372	511	490	279	212	7	1,634	452	1,487	25	
Sacramento	331	219	112	288	35	8	28	28	34	32	27	24	20	26	21	25	26	40	51	32	11	10	52	47	55	37	27	6	100	101	128	2	
Petaluma	41	23	18	39	12	2	2	5	1	7	3	2	5	3	1	3	4	6	9	3	2	1	2	6	6	3	3	0	21	15	5	1	
Dixon and surroundings	16	10	6	16	12	1	1	1	0	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9	3	3	1	
Stockton	131	88	43	116	21	5	11	10	11	11	12	10	8	8	12	9	19	17	30	16	5	13	23	21	11	9	0	58	34	32	2		
Marysville	106	69	37	80	21	5	10	7	9	8	16	9	10	4	8	7	9	9	13	8	3	4	19	17	21	13	6	25	33	48	8		
Placerville	34	22	12	34	1	0	5	2	2	5	4	1	3	1	4	1	2	4	4	5	12	1	1	5	8	4	0	14	12	8	4	2	
Auburn and surroundings	13	11	4	14	1	0	0	0	0	0	3	3	0	0	0	0	0	3	1	0	0	1	3	3	3	3	0	2	1	8	4	2	
San Diego County	56	41	15	55	1	0	11	10	5	11	12	10	5	2	2	5	6	1	8	3	1	4	3	15	12	1	3	0	18	19	16	3	
Oroville and surroundings	18	17	1	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	5	3	3	0	3	11	4	0	
Woodland	16	12	4	16	1	0	1	0	1	0	0	7	4	16	5	6	0	1	1	1	1	1	3	3	3	1	0	1	5	9	27	2	
Oakland	112	60	52	102	7	3	5	8	10	11	8	4	6	16	8	9	10	17	27	14	3	7	13	14	15	8	11	0	46	37	42	2	
Los Angeles and surroundings*	293	187	106	239	53	1	12	17	21	46	29	31	17	24	17	20	30	29	59	40	12	14	31	52	30	15	17	23	161	40	58	4	
Truckee and surroundings	17	14	3	17	0	0	4	2	1	0	3	2	0	0	2	0	0	3	5	1	0	1	2	3	3	1	1	0	5	7	12	1	
St. Helena and surroundings	9	5	4	9	1	0	1	0	2	2	0	0	0	0	1	0	4	0	0	1	0	0	2	4	3	0	0	0	3	2	7	1	
Napa City	38	22	16	33	6	4	6	4	3	3	5	3	1	1	0	2	5	7	5	6	1	4	6	3	2	2	2	4	14	16	8	3	
Watsonville	5	3	2	5	1	0	1	1	0	0	0	0	0	0	1	1	0	1	1	1	0	0	1	1	1	1	0	0	1	2	2	2	
Folsom and surroundings	6	4	2	6	1	0	0	0	1	0	0	0	0	0	2	0	0	0	1	0	0	0	1	2	0	0	0	0	2	1	1	1	
Bridgeport Township	7	7	0	6	1	0	2	0	0	0	0	0	2	0	3	0	0	0	2	0	0	0	2	0	1	1	1	0	0	3	2	2	
Santa Barbara	73	48	25	68	5	4	6	4	4	10	4	11	5	3	4	8	6	10	12	6	4	14	11	6	6	0	50	14	8	4	0		
Redwood City	23	14	9	23	1	0	0	0	2	2	2	1	1	1	2	4	1	1	4	5	0	0	0	6	2	0	0	0	1	6	8	7	
Trinity County	21	20	1	20	1	0	1	2	3	2	1	3	4	2	0	0	1	1	2	0	0	0	1	5	6	3	0	0	6	8	7	0	
Monterey	9	7	2	5	4	1	1	1	1	2	0	0	0	0	0	0	1	3	1	1	1	1	1	1	1	1	0	5	5	2	2	0	
Santa Cruz	36	21	15	36	1	0	5	0	2	4	4	4	0	2	2	5	0	3	5	12	5	1	1	1	7	4	1	4	0	19	12	5	0
Salmon and Fairfield	23	18	5	19	3	1	5	1	2	4	4	0	1	0	0	2	1	3	1	1	1	2	3	4	2	2	0	4	13	6	5	1	
Colusa and surroundings	24	18	6	23	1	0	5	3	1	1	2	2	0	1	4	1	3	3	4	2	1	1	1	6	4	0	0	7	11	6	5	1	
Totals of twenty-six localities	4,464	2,971	1,493	3,883	507	74	348	350	363	463	367	379	323	351	350	351	400	413	917	455	137	175	548	752	708	406	323	43	1,628	879	1,913	44	

* The extraordinary mortality in Los Angeles, during October, is due to a riot, in which nineteen Chinamen were killed.

be seen that the percentage of deaths to population in California is one tenth of one per cent less than by our calculation:

TABLE No. 3.

STATES AND TERRITORIES.	1870.				
	Population.	DEATHS.			Percentage of deaths to population.....
		Total	Males	Females.....	
United States.....	38,555,983	492,263	260,673	231,590	1.28
Alabama	996,992	10,771	5,637	5,134	1.08
Arizona.....	9,658	252	168	84	2.61
Arkansas.....	484,471	6,119	3,202	2,917	1.26
California.....	560,247	9,025	5,687	3,338	1.61
Colorado.....	39,864	375	232	143	0.94
Connecticut	537,454	6,796	3,550	3,246	1.26
Dakota.....	14,181	101	69	32	0.71
Delaware	125,015	1,561	827	734	1.25
District of Columbia.....	131,700	2,015	1,065	950	1.53
Florida	187,748	2,264	1,225	1,039	1.21
Georgia	1,184,109	13,606	6,990	6,616	1.15
Idaho.....	14,999	50	39	11	0.33
Illinois	2,539,891	33,672	18,141	15,531	1.33
Indiana	1,680,637	17,661	9,208	8,453	1.05
Iowa	1,191,792	9,597	5,117	4,480	0.81
Kansas.....	364,399	4,546	2,433	2,113	1.25
Kentucky	1,321,011	14,345	7,394	6,951	1.09
Louisiana.....	726,915	14,499	8,212	6,287	2.00
Maine	626,915	7,728	3,993	3,735	1.23
Maryland.....	780,894	9,740	5,085	4,655	1.24
Massachusetts.....	1,457,351	25,859	12,894	12,965	1.77
Michigan	1,184,059	11,181	5,771	5,410	0.94
Minnesota	489,706	3,526	1,949	1,577	0.80
Mississippi.....	827,922	9,172	4,788	4,384	1.11
Missouri	1,721,295	27,982	15,762	12,220	1.63
Montana	20,595	185	137	48	0.90
Nebraska	122,993	1,000	545	455	0.81
Nevada	42,491	615	423	192	1.45
New Hampshire	318,300	4,291	2,092	2,199	1.35
New Jersey.....	906,096	10,586	5,716	4,870	1.17
New Mexico.....	91,874	1,180	623	557	1.28
New York.....	4,382,759	69,095	36,740	32,355	1.58
North Carolina	1,071,361	10,588	5,142	5,446	0.98
Ohio	2,665,260	29,568	15,724	13,844	1.11
Oregon	90,923	622	337	285	0.69
Pennsylvania.....	3,521,791	52,639	27,961	24,678	1.49
Rhode Island.....	217,353	2,741	1,423	1,318	1.26
South Carolina.....	705,606	7,380	3,757	3,623	1.05
Tennessee.....	1,258,520	14,239	6,963	7,276	1.13
Texas.....	818,579	11,197	6,254	4,943	1.37
Utah	86,786	891	452	439	1.03
Vermont.....	330,551	3,545	1,804	1,741	1.07
Virginia	1,225,163	15,183	7,552	7,631	1.24
Washington	23,955	223	131	92	0.93
West Virginia.....	442,014	4,018	2,061	1,957	0.91
Wisconsin	1,054,670	9,960	5,339	4,621	0.94
Wyoming	9,118	74	59	15	0.81

With regard to race, the mortality of the black is nearly two per cent, while the black population, according to the United States Census, is less than one per cent of the whole. This shows a larger mortality than that of the whites, and is attributable to improvidence and ignorance. The mortality of the copper-colored races, which include Chinese and Indians, is about eleven per cent, while they constitute about ten per cent of the population. The white race is thus, by comparison, demonstrated to be the healthiest, and its mortality the least.

One of the most important and encouraging facts, indicative of the salubrity of our climate, and a better condition of society, is demonstrated in a smaller infantile mortality than in any other State or country. Less than one third (thirty-one per cent) of the decedents were under five years of age; and this holds good, as well for our larger cities, as for rural and smaller towns. The reason for felicitation in this respect will be more apparent, when it is considered how frightfully this infant mortality has increased all over the country, and especially in our larger cities. The largest increase was in Chicago. In the year eighteen hundred and forty-three, the death-rate of children under five years was only twenty-nine per cent of all the deaths; but it has slowly risen till in eighteen hundred and sixty-nine, it had reached to sixty-three per cent. Next to Chicago stands St. Louis, where last year the death-rate of children under five years was fifty-one per cent of the entire mortality. New York City is almost the same as St. Louis, and in the year eighteen hundred and seventy-one it was greater, that being an exceptional year, and amounting to over seventy-seven per cent. Next to New York stands Baltimore, with a percentage of fifty per cent, and then Cincinnati and Philadelphia, with forty-six per cent., and New Orleans, with forty-three per cent. Providence, R. I., shows only thirty-seven per cent, but that city has made sanitary knowledge a specialty.

Fortunately, for our race and country, this decimating mortality among the young is not equally as great in the rural districts of the United States. In Rhode Island, which shows the lowest rate, the registration reports in eighteen hundred and fifty-two, eighteen hundred and fifty-three, eighteen hundred and fifty-four, eighteen hundred and sixty-four, eighteen hundred and sixty-five, eighteen hundred and sixty-seven, and eighteen hundred and sixty-eight, seven years, give sixteen thousand and sixty deaths, of which one thousand five hundred and forty were under five years, which is 34.45 per cent of the whole number. In several other States, which it is unnecessary to enumerate, the same results, only in a more marked contrast, obtain in this respect; and to such a degree, that when the whole mortality of the United States is considered in the aggregate, the small mortality among children in the rural districts is sufficient to overcome the unfavorable reports of cities, and presents the following proportions, as shown by the United States Census:

CENSUS.	Total mortality in United States.....	Mortality under five years.....
Census of 1850.....	323,272	123,211
Census of 1860.....	392,821	168,235
Census of 1870.....	492,263	203,213

Doctor J. M. Toner, of Washington, who has compiled the above items for the census, remarks thus in relation thereto:

"It is, therefore, fair to infer from these data, which confirm individual experience, that there are causes operating in cities, unfavorable to the health and lives of children, that do not exist, or manifest themselves so disastrously, in the country. The causes that enfeeble or destroy human life in infancy are so manifold—constitutional, moral, and hygienic—that I will not attempt to enumerate them here. They are patent to all reflecting minds, and are constantly referred to in health reports."

The most healthy period seems to be between five and ten years, during which there occurred the least mortality, viz: one hundred and thirty-seven; and the next healthiest, the second decade, when one hundred and seventy-five died. In the three decades, between twenty and fifty years, as is the case in all mortality statistics, the greatest number of deaths, exclusive of the period of infancy, occurred; *i. e.*, two thousand and eight, or forty-five per cent of the total.

No account was taken of premature births or stillborn, nor do they enter at all into the computation.

Looking at the columns of nativities in our table, it will be seen that about forty per cent are foreign born, and nearly thirty-six per cent native born. This would leave twenty-four per cent natives of the Atlantic States, and unascertained.

There remains yet another important item of information to be derived from this table, and that is the mortality by months. It will be observed, that:

The greatest number of deaths occurred in October.....	463
The next greatest number of deaths occurred in June.....	413
The next greatest number of deaths occurred in May.....	400
The next greatest number of deaths occurred in December.....	379
The next greatest number of deaths occurred in November.....	366
The next greatest number of deaths occurred in September.....	363
The next greatest number of deaths occurred in March.....	356
The next greatest number of deaths occurred in February.....	351
The next greatest number of deaths occurred in April.....	351
The next greatest number of deaths occurred in August.....	350
The next greatest number of deaths occurred in July.....	348
The least number of deaths occurred in January.....	323
Total for twelve months.....	4,464*

It is readily seen that the greatest mortality was not coincident with the highest temperature, but occurred two or three months after this period. This fact will again be referred to when discussing the subject of meteorology. Proceeding from all causes to the special, may be traced through the progression of the months the fatal march of certain prevalent diseases.

* The slight discrepancies between some of the items in this report and in the article on "Mortality Statistics" in the Transactions of the State Medical Society, are caused by the reception of more complete information since the latter publication was printed. The same reason will account for certain trifling inaccuracies in the diagrams, which were engraved at the same time for both publications.

TABLE No. 4.
Comparative table of mortality of certain prevalent diseases, by months.

MONTHS.	1870-71.	1871-72.	1870-71.	1871-72.	1870-71.	1871-72.	1870-71.	1871-72.	1870-71.	1871-72.	1870-71.	1871-72.	1870-71.	1871-72.	1870-71.	1871-72.	Total	Total
	Consumption	Consumption	Other diseases of lungs.	Other diseases of lungs.	Diseases of stomach and bowels.....	Diseases of stomach and bowels.....	Diphtheria.....	Diphtheria.....	Scarlatina.....	Scarlatina.....	Typho-malarial fevers.	Typho-malarial fevers.	Total.....	Total.....	Total.....	Total.....	Total.....	Total.....
July.....	57	47	21	13	37	19	7	2	4	1	18	17	144	99	1,807	1,684		
August.....	63	54	24	16	29	25	5	2	3	2	13	18	146	117				
September	63	59	19	12	38	46	5	3	6	1	21	24	143	145				
October.....	64	64	27	37	33	72	4	4	15	1	34	21	167	199				
November.....	64	64	33	40	18	13	9	6	15	1	43	23	182	147				
December.....	65	64	51	36	22	17	6	1	13	4	24	11	181	143				
January.....	85	68	48	20	9	10	9	1	15	3	30	11	196	113				
February.....	59	59	51	43	11	18	.....	3	6	4	13	14	140	139				
March.....	70	74	42	35	12	10	.....	8	4	3	13	18	143	143				
April.....	69	73	22	38	8	9	4	.....	4	1	7	11	114	132				
May.....	55	78	23	33	33	31	1	12	4	1	8	16	124	171				
June.....	60	50	19	33	30	39	1	2	4	2	13	10	127	136				
Totals	774	754	380	356	270	309	53	37	93	24	237	204	1,807	1,684				

Of the causes of these deaths, the largest number, seven hundred and fifty-four, occurred from consumption; the greatest mortality of this disease being seventy-eight, in May, eighteen hundred and seventy-two, and the least, forty-seven, in July, eighteen hundred and seventy-one. The means of these periods, compared with our former report of the State Board of Health, shows an improvement, within a small fraction of twelve per cent. For the purposes of comparison, and in order that the remarkable similarity of the mortality of the two years may be seen at a glance, the monthly deaths of the previous year are placed in the left hand column.

From other diseases of the lungs, the greatest mortality, forty-three, was in February, eighteen hundred and seventy-two, and the least in September, eighteen hundred and seventy-one. The mean of these periods, compared with the former report, just referred to, shows an improvement of more than twenty per cent.

From diseases of the stomach and bowels, the greatest number, seventy-two, died in October, eighteen hundred and seventy-one, and the least, nine, in April, eighteen hundred and seventy-two. The mean, compared as above, shows an increase of seventy-six per cent.

The greatest number of deaths by diptheria was twelve, in May, eighteen hundred and seventy-two, against nine in November, which was the most fatal month in eighteen hundred and seventy-one, and the least, *none*, in April, eighteen hundred and seventy-two.

Scarlatina proved most fatal in December, eighteen hundred and seventy-one, and February, eighteen hundred and seventy-two—four deaths in each month; while our former report showed three most fatal months, viz: October, November, and January—fifteen each. The least fatal months by this disease show only one death each for six months, namely: July, September, October, and November, eighteen hundred and seventy-one, and April and May, eighteen hundred and seventy-two; while the least fatal six months of our last report were five months of four each and one of three; total, twenty-three, against six for a corresponding period in eighteen hundred and seventy-one and eighteen hundred and seventy-two.

Typho-malaria fevers proved most fatal (twenty-four-deaths) in September, eighteen hundred and seventy-one, and least fatal (eleven deaths) in January and April, eighteen hundred and seventy-two. Forty-three and seven were the amounts for the corresponding most fatal and least fatal months, of March and April, in the last report.

From all the most prevalent diseases, the greatest number, one hundred and ninety-nine, died in October, eighteen hundred and seventy-one, which, as has already been seen, was also the most fatal month in the general total; the least number, ninety-nine, in July, eighteen hundred and seventy-one, corresponds with the month's least number in the general total.

The greatest number from prevalent diseases, in any month, in last report, was one hundred and ninety-six in January, eighteen hundred and seventy-one; the least, one hundred and fourteen, in April, eighteen hundred and seventy-one, or fifteen per cent more than our present report. Altogether, these results show a marked diminution of the mortality in the State, and consequently an increase in the average duration of life, which may be largely credited, in addition to climatic influences, to the advanced general intelligence, the multiplication of comforts, the hygienic and other measures for the better protection from the elements, as well as from the causes of disease, the abundant supply of wholesome

food, and all the inventions for exhaustive labor-saving, which, as well as the improvement of morals, we are accustomed to sum up in one phrase, as "the progress of civilization."

Unfortunately, owing to the difficulties which attend a correct diagnosis, such as the less definite employment of nosological nomenclature, which allows many deaths to be credited to the wrong disease, and the shameful fact that the most ignorant non professional persons are permitted to give a certificate of death, but little reliance can be placed on such statistics as to special diseases. They may be trusted, nevertheless, in regard to total mortality, and to such particular diseases as consumption, diseases of the lungs, and of the stomach and bowels, and typho-malarial fevers, which are popularly well known, and to which I have chiefly confined my investigation. My present purpose is only to show, in as condensed a form as possible, by means of tables and diagrams, a few of the practical facts investigated in such researches.

The most reliable and valuable of these are: First—The ratio of annual deaths to the population, or the death-rate. Second—The ratio of the deaths by certain special diseases to the population, and to the death-rate—*i. e.*, the prevalency and fatality of certain diseases.

It must be borne in mind, however, in drawing any conclusion from the important class of facts here presented, that the difference which exists between the ratio of deaths by a particular disease to the total population and the total deaths, proves a frequent cause of error.

To illustrate: The ratio of deaths by consumption in Marysville is very large, while this ratio to the total deaths is comparatively small, and for the reason that the total of all deaths in Marysville is comparatively very large. Observations of this small ratio in the one case, without proper consideration of the larger ratio in the other, might induce many to make the erroneous assertion that consumption was not so fatal here as it really is shown to be. Of course, here, as well as in Santa Barbara, the mortality by consumption, as well as the total mortality, is exaggerated by extraordinary causes—the advent of the phthisical and other sick, in search of a more favorable climate, which invalidate any legitimate deductions as to local salubrity.

In order to arrive at a distinct comprehension of the bearing of figures in the foregoing tables, it must be borne in mind that the limit of percentage of deaths which statisticians agree to be unavoidable, is eleven to one thousand; all above this rate they hold to be preventable by precaution, in healthy countries. In rare instances the rate falls below the necessary limit, as, for example, in Michigan, where it was as low as eight to the thousand in eighteen hundred and seventy. I am not aware, however, that what is termed the necessary rate has ever been reached in cities. Mortality is always much greater where the population is dense, and in London the standard sought to be obtained is seventeen in one thousand, though, in fact, this has thus far always been exceeded. In practice it is generally conceded that city mortality, when under twenty, shows a very high rate of health. When varying between twenty and twenty-five, it shows a fair standard of health; and when reaching thirty, it shows an alarming degree of sickness. In Massachusetts, in eighteen hundred and fifty-eight, the death-rate was twenty and two tenths per one thousand. In California, for eighteen hundred and seventy and eighteen hundred and seventy-one, it was about eighteen and eight tenths per one thousand, and in the accompanying tables for eighteen hundred and seventy-one and eighteen hundred and seventy-

two, it is shown that the death-rate has declined to seventeen and one tenth per one thousand.

To afford the means of forming a judgment respecting the salubrity of other points of the State, when compared with foreign countries, the annexed Table No. 5, based upon data furnished in Motard's "Traité d'Hygiene Generale," and compiled from the "Handbuch der Medicinischen Statistik," of Osterlen, and "Allgemeine Bevolkorungs Statistik" of Wappæus, is here copied from the last year's report of the State Board of Health:

TABLE No. 5.

Relative mortality.

COUNTRIES.	In cities, one in.....	In rural dis- tricts, one in
France, 1858	35.10	44.30
England, 1850-1859.....	37.44	54.34
Holland, 1850-1854.....	35.55	43.03
Belgium, 1851-1855.....	34.35	44.31
Sweden, 1851-1855.....	28.95	46.86
Denmark, 1850-1854.....	37.41	49.77
Prussia, 1849.....	27.97	34.46
California, 1870-1871.....	49.45	130.77

The mortality of the great cities of the Union for eighteen hundred and seventy-one was stated, in the last report of the State Board of Health, as follows, per one thousand: St. Louis, twenty-one and three tenths; San Francisco, twenty-one and four tenths; Boston, twenty-four; Chicago, twenty-four and five tenths; Philadelphia, twenty-five and five tenths; Baltimore, twenty-seven and one tenth; New York, twenty-nine and three tenths; New Orleans, thirty-seven and six tenths. It will be noticed that, according to the rule given above, the mortality of New Orleans was enormous; but this is, in a great measure, accounted for by the fact that in the year referred to, yellow fever and smallpox carried off at least a fifth of all who died during the twelve months. In the annual report of the Board of Health of Louisiana, I find the death-rate of eighteen hundred and seventy-one to be twenty-eight and six tenths per one thousand. St. Louis was noted, in our last report, as the healthiest large city in the world. During the year eighteen hundred and seventy-one, the mortality was only one and sixty-seven hundredths per cent, or sixteen and a fraction per one thousand of the population. San Francisco was regarded as the second healthiest city of the eight mentioned above. Its mortality is put down in our present table at nineteen and nine tenths per one thousand. This calculation is based upon the United States Census for eighteen hundred and seventy. The compiler of the San Francisco Directory, from carefully collected statistics, placed the population at one hundred and seventy-eight thousand two hundred and seventy-six. The year previous it was one hundred and seventy-two thousand seven hundred and fifty. Taking a mean between these two, as the average population during eighteen hundred

and seventy-one, the per thousands of deaths was sixteen and nine tenths. In like manner, estimating the present population at one hundred and ninety-five thousand, and the mean population for eighteen hundred and seventy-two at one hundred and eighty-six thousand, the death-rate for the year just passed will be sixteen and nine tenths per thousand. Dr. Gibbons, from whom I here quote, says, "even if this estimate be based on an exaggeration of the population, which is by no means admitted, and we take as the standard the United States Census returns of one hundred and fifty thousand, in eighteen hundred and seventy, the showing will then be but eighteen and five tenths per one thousand." The same reasoning will apply to Sacramento. The calculation of our present table is also based upon the United States Census for eighteen hundred and seventy. A more recent city census shows the number of resident inhabitants to be nineteen thousand six hundred and thirty-nine, and, without adding for the increase in population, this would reduce the rate to sixteen and nine tenths per one thousand, and thus place Sacramento on a par with St. Louis. Of the larger country towns, Petaluma carries off the palm in point of salubrity. Since the death-rate in the table was calculated, a copy of the United States Census has been received, which gives a population of four thousand five hundred and eighty-eight inhabitants, and thus reduces the ratio from eleven and seven tenths to eight and nine tenths per one thousand. Of rural districts, Watsonville, Folsom, and surroundings, and Bridgeport Township (North San Juan), prove the healthiest. I am inclined to think, however, that the population of the second just named locality, has been put down to too high a figure by the medical gentlemen—the area of whose practice was, nevertheless, very extended.

In order to afford a correct judgment of the favorable sanitary condition of California, when compared with some of the Eastern States, as revealed by our tables for eighteen hundred and seventy-one and eighteen hundred and seventy-two, I quote from a recent report of the President of the Mutual Benefit Life Insurance Company of Newark, New Jersey:

"The great event of the year has been the increased mortality in all sections of the country—beginning, in the Winter of eighteen hundred and seventy-one and eighteen hundred and seventy-two, with typhoid pneumonia, which prevailed in many sections like an epidemic, together with acute diseases of the brain and other vital organs. The intense cold of the Winter, and peculiar character of the atmosphere, exhausted life so rapidly that the mortality steadily increased, and continued into the Spring and up to Summer, when the extreme heat did its part, and the ravages of death continued until the Fall, when, as usual, large numbers of the aged and feeble fell under the influence of the changing season, and brought us to the close of what will probably be shown to be the most fatal year of a generation. The statistics of Newark, New York, Boston, Philadelphia, and such others as have been published, confirm the foregoing opinion. An examination of the statistics that have appeared shows that, aside from the great mortality among children, the death-rate among those of insurable age has largely increased. In some places it has increased to over twenty per cent."

THE HEALTHIEST LARGE CITY IN THE WORLD.

Since the foregoing pages were written, some of the respective journals of New York and Philadelphia have been measuring lances on the subject of the comparative uncleanness, and necessarily unhealthiness of their particular cities. The contest has been a warm one, and has elicited considerable information, from which the *San Francisco Bulletin* has constructed the following interesting statements:

"Tabulated statements recently prepared by Dr. Charles P. Russell, Registrar of vital statistics in New York, for insertion in the forthcoming report of the Board of Health of that city, establish that San Francisco is not only the most healthy of all the large cities on this continent, but of the large cities throughout the world. The death-rate of eighteen hundred and seventy-two, based on the population of sixteen of the large cities of America, and the number of deaths per thousand of the population, is stated as follows:

Cities.	Death rate.	Cities.	Death rate.
San Francisco	17	New Orleans.....	30
St. Louis	20	Newark	31
Cincinnati	20	Halifax.....	31
Baltimore	25	New York.....	32
Philadelphia	26	Savannah.....	36
Chicago.....	27	Montreal.....	37
Brooklyn	28	Memphis	46
Boston	30	Valparaiso (Chile)	66

"Dr. Russell has, in addition, obtained the death-rate per thousand of twenty-seven European cities, and these show as under:

Cities.	Death rate.	Cities.	Death rate.
Zurich.....	13	Genoa	31
Geneva.....	19	Stockholm	31
Basle.....	20	Nice	31
London.....	21	Havre	31
Paris	21	Rotterdam	31
Liverpool	27	Berlin	32
Leeds	27	Bologna	32
Glasgow.....	28	Naples.....	35
Manchester.....	28	Florence	35
Dublin	29	Rome	36
Leghorn	30	Prague	41
Venice.....	30	Munich	41
Milan	30	Cadiz.....	44
Vienna.....	31		

"Zurich, the highest on the list, contains scarce twenty thousand inhabitants, and therefore does not come within the category of large cities. Excepting Zurich, San Francisco makes the most favorable showing in both lists. In the dense centers of population in Asia, mor-

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TABLE OF THE NECROLOGY OF SACRAMENTO FOR THE YEAR EIGHTEEN HUNDRED AND SEVENTY-TWO.

Arranged according to the classification recommended by the American Medical Association.

[illegible]

tality records are not kept, but it is known that the death-rate is much higher than in either European or American cities. London and Paris, where the death-rate is alike, twenty-one per thousand admirably illustrate the connection between mortuary returns and a good system of sewerage. They are probably the best drained cities anywhere to be found. The Thames and the Seine, which formerly resembled elongated open cesspools, extending through the centre of those cities, are now comparatively clear streams, and the fish, which had abandoned them, have returned. A marked decrease in the death-rates of the two cities has been noted as the consequence. The present favorable position of San Francisco as a very healthy city, should incite efforts on the part of the municipal authorities to make it still better. There are but few cities of the world so well situate for drainage. The variation of altitude offers a good fall, and there is but a short distance for the sewage matter to be carried before it mingles with the waters of the ocean. In London, on the contrary, the sewage has to be pumped up two or three times before it is discharged into the Thames, at a distance of fifteen or sixteen miles below the city. Yet, how large a portion of San Francisco lacks efficient drainage. Let us not trust too much to our healthful Summer breezes, but with clean streets and well drained houses, let us continue to maintain our position as the healthiest city, not alone on the American continent, but in the whole world."

To present a more complete showing of all the diseases which have caused the total mortality just discussed, the following necrological tables of the metropolis and the capital of California—San Francisco being the type of the coast region, and Sacramento representing the interior-valley region—are here superadded. Although these tables do not cover the precise time embraced in the preceding—commencing as they do in January and ending in December, eighteen hundred and seventy-two, instead of commencing in July, eighteen hundred and seventy-one, and ending in June, eighteen hundred and seventy-two—still they answer all purposes as well.

In order that the remarkable similarity of two of the healthiest years may be seen at a glance, the totals of the previous year are placed in the right-hand columns.

The table for San Francisco, which has been prepared by Doctor Henry Gibbons, Jr., the present Health Officer of that city, although not exactly in accordance with the classification already alluded to, agrees so nearly in its general outlines with the one adopted by us as to render it very easy to make comparisons.

MORTALITY STATISTICS OF SAN FRANCISCO.

TABLE I.—CAUSES OF DEATH.

	1872.	January.....	February ..	March.....	April	May	June	July	August.....	September.	October....	November.	December .	Total.....	1871.
CLASS I.—ZYMOTIC DISEASES.															
Order 1.—Miasmatic Diseases.															
Typhoid fever.....		8	7	7	2	6	7	7	7	7	7	9	12	86	111
Typhus fever.....		1	2	.....	.....	.....	.....	.....	.....	1	.....	.....	4	2
Scarlet fever.....		3	3	3	1	1	1	1	2	.....	1	3	3	22	18
Diarrhea	2	2	4	4	2	3	4	3	.....	24	32
Dysentery		1	1	2	1	3	7	3	1	.....	2	3	.....	26	37
Erysipelas		3	3	3	2	3	1	2	1	.....	.....	2	.....	28	10
Smallpox	4	11	2	2	.....	.....	8	20	2
Diphtheria		1	1	1	.....	4	2	.....	2	6	4	8	6	41	23
Croup		3	9	3	2	1	.....	1	2	4	1	4	2	32	25
Whooping cough.....		2	.....	3	5	2	.....	3	2	3	1	10	.....	31	22
Measles	1	1	2
Pyæmia (Toxæmia).....		3	1	4	3	.....	1	1	4	4	.....	.....	2	23	17
Other diseases of this order.....		8	4	7	6	5	2	.....	1	1	2	2	2	40	40
Order 2.—Enthetic Diseases.															
Syphilis		4	3	2	1	3	.....	.....	.....	.....	1	3	2	20	25

MORTALITY STATISTICS OF SAN FRANCISCO—Continued.

48

	1872.	1871.
Murder and manslaughter.....	.....	9
Order 3.— <i>Suicide</i>.....	.....	35
DEATHS, WHICH, FROM INSUFFICIENT DIAGNOSIS, ORDER 3.— <i>Suicide</i> IT IS IMPOSSIBLE TO CLASSIFY.	.....	37
Asphyxia.....	.....	1
Dropsy and Ascites.....	.....	48
Hemorrhage .....	.....	7
Gangrene .....	.....	9
Tumor .....	.....	8
Unknown.....	.....	134
Totals.....	226	3,154
January ...	3	294
February...	1 5	320
March.....	..... 2	239
April.....	1 3	260
May .....	..... 4	284
June .....	..... 1	267
July	3 1	247
August	2 3	263
September.	..... 5	255
October	1 1	256
November.	..... 4	243
December..	1 3	226
Total.....	9 35	2,957

MORTALITY STATISTICS OF SAN FRANCISCO.

TABLE II.—SEX, RACE, NATIVITY, AND LOCALITY OF DEATH OF DECEDENTS.

1872.	Jan....	Feb....	March.	April..	May...	June...	July...	Aug....	Sept...	Oct.....	Nov....	Dec....	Totals..	1871.
Whole number of deaths	226	243	256	255	263	247	267	284	260	239	320	294	3,154	2,957
SEX.														
Males	163	158	175	178	177	172	174	170	158	151	197	182	2,055	1,951
Females	63	85	81	77	86	75	93	114	102	88	123	112	1,097	1,006
RACE.*														
Caucasian	194	210	215	207	226	218	240	247	236	206	286	252	2,737	2,603
Mongolian	28	31	40	41	31	22	25	31	23	29	27	39	367	310
African	4	2	1	7	6	7	2	6	1	4	7	3	50	44
NATIVITY.														
California	56	86	89	72	69	95	100	119	109	85	126	92	1,098	1,059
Other parts of the United States.....	47	36	39	51	43	39	47	31	31	39	46	49	598	442
England and Wales.....	4	7	9	8	14	5	8	15	6	5	10	10	101	111
Scotland	5	1	2	1	2	3	4	.....	4	2	4	4	32	31
Ireland	40	34	37	39	44	36	29	40	41	36	48	49	473	444
German States	17	19	18	15	19	18	24	17	19	17	20	20	223	231
France.....	8	8	5	13	11	11	11	12	11	7	11	10	118	86
Other European countries.....	10	12	9	8	12	10	11	13	8	9	16	10	128	115
British American Provinces.....	1	3	2	2	3	.....	3	3	2	1	3	3	29	39
South America .....	.....	.....	2	2	6	1	.....	1	1	1	2	1	15	9
Mexico.....	2	3	3	4	6	2	.....	4	3	4	3	5	41	30
China	32	28	38	37	31	23	24	26	20	27	24	35	245	291
Other countries.....	3	2	3	2	2	4	3	3	2	3	4	3	33	44
Unknown.....	.....	4	.....	1	1	.....	1	1	3	3	3	3	20	25

TABLE II—Continued.

1872.	1871.
LOCALITY.	
City Wards	2,253
City and County Hospital.....	227
U. S. Marine Hospital	21
French Hospital.....	72
German Hospital.....	54
Italian Hospital.....	29
St. Mary's Hospital.....	15
Smallpox Hospital.....	100
Alms-house.....	21
Other Charities.....	42
Casualties	76
Suicide.....	98
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*In this connection, the following remarks on "The Relations of Races and Nationality to Mortality in the United States," are deemed of sufficient interest to be inserted while this report is going through the press:

"General Francis A. Walker, Superintendent United States Census, at the recent meeting of the American Public Health Association, New York City, spoke on 'The Relations of Race and Nationality to Mortality in the United States.' He said the returns of deaths in the census failed to meet the known facts of the case by something between thirty-five and thirty-nine per cent. That percentage of the death rate is omitted. What, then, was the value of a return so defective? He expressed the belief that the returns of the census were sufficient to establish all the great relations of mortality between races and nationalities, and he accepted the result as decisive. For the purpose of discussion, he would take the returns of deaths in the census as sufficient. General Walker proceeded to illustrate the proportion of deaths among native-born and the foreign elements of the population, as represented in the death-rate of the census. He stated from statistics the number of native-born Americans, the number of colored people, the number of German, Irish, English, Welsh, and the other foreign elements, which go to make up the bulk of the population, and produced a great number of diagrams, with which he showed, as is stated in the census, the mortality among each element. These diagrams showed that among children the mortality was far greater among the native-born, for the simple reason that the proportion of foreigners under ten years of age was exceedingly small, being altogether only two hundred thousand. In proportion to their numbers, however, from the peculiarity of their circumstances and the rudeness with which they were forced into new modes of life, the mortality was greater than that of native-born children.

The whole statistics presented the fact that the mortality among the foreign element was far greater than among natives, in every description of disease. Notably in consumption, pulmonary affections generally, and Bright's disease of the kidneys, etc. He also showed, from statistical data, that while the foreign element mostly resided in the North, the colored population inhabited the Southern States, and their climatic relations to a large extent affected their constitutions and materially changed the extent of their mortality, for while the foreign population of the North were subject to certain diseases which they would be exempt from in the Southern States, he also found that negroes of the South were entirely free from certain affections to which in the North they would be predisposed.

MORTALITY STATISTICS OF SAN FRANCISCO.

TABLE III.—AGES AND DEATHS IN DIFFERENT MONTHS.

	1872.	1871.
	January ...	Total.....
Under one year.....	28	691
From one to two years.....	11	13
From two to five years.....	10	165
From five to ten years.....	6	148
From ten to fifteen years.....	6	86
From fifteen to twenty years.....	7	94
From twenty to thirty years.....	31	43
From thirty to forty years.....	44	54
From forty to fifty years.....	45	374
From fifty to sixty years.....	16	518
From sixty to seventy years.....	10	49
From seventy to eighty years.....	5	506
From eighty to ninety years.....	5	475
From ninety to one hundred years.....	5	290
Over one hundred years.....	5	231
Unknown.....	2	122
Total.....	226	65
Still-born.....	14	70
		17
		3
		8
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		8

Considering the importance of mortality statistics, as tending towards the prevention of deaths, by increased knowledge of the diseases causing them, I have endeavored further to present the subject in as concise and inviting a manner as possible, by means of diagrams and maps. While the former have been graphically arranged, with much painstaking care, from the tables just discussed, the latter have been compiled from the last decennial United States Census, for the purpose of contrasting the results from those two sources of information. Through such means, it is believed, I shall best be enabled to demonstrate, at a glance, intensities, amounts, and results, with an infinite saving of time, and what is far more desirable, with numerical precision, and ocular proof.

CONSUMPTION. (*Blue Tints.*)

The deepest tint (V) in the blue map, taken from the census, shows that the greatest mortality by consumption occurs in the region including Russian River, Napa, Sonoma, and Petaluma Valleys, and that portion of the Sacramento Valley embraced in Yolo and Solano Counties—the rate of mortality being twenty per cent. The diagram (per cent of consumption to total number of deaths) shows the greatest mortality by consumption to be in Woodland. In this particular it coincides with the census map, but in special localities, within the district of tint (V) in the map, such as Napa City, Bridgeport Township, Suisun, and Fairfield, the mortality is seen to be very much lighter by the diagram.

The next deepest blue tint (IV) would seem to include the southern part of the San Francisco peninsula, the San José and San Joaquin Valleys, and Fresno, Tuolumne, and Mariposa Counties, in the foothills—the rate of mortality being fourteen to twenty per cent. As far as shown, this corresponds with the diagram.

The next tint (III) includes the peninsula of San Francisco and the Counties of Contra Costa and Alameda, or the country lying about the Bay of San Francisco; also, the coast region between Los Angeles and Santa Cruz; the rate of mortality being from nine to fourteen per cent. This gives Santa Barbara and Santa Cruz a lower rate of mortality than the diagram, which shows the mortality of these localities to be among the maxima rates, owing to special causes already mentioned. In the instance of the country about San Francisco Bay, the diagram coincides with the census map.

The next tint (II) comprises that portion of the Sacramento Valley east of the river and north of Colusa, together with that section of the Sierra Nevada region embracing Plumas, Sierra, Nevada, and Placer Counties; the rate of mortality being from five and one half to nine per cent. The diagram corresponds with this, except that Truckee, and surroundings, show a very high rate of mortality, owing to the special cause of its being a transient resort for invalids during the Summer season.

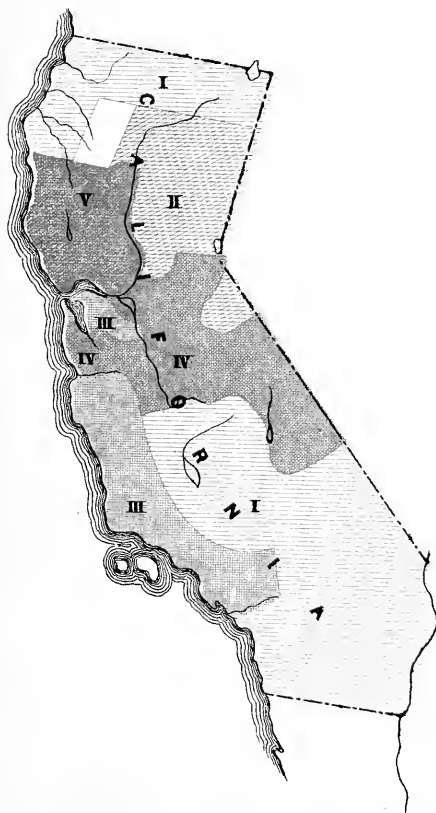
The lightest tint (I) covers the desert country east of Los Angeles and San Diego, and the region about Fort Tejon; also, the extreme northern part of the State, including the sage-brush plains or barrens of Siskiyou County and the wooded hills of Del Norte and Klamath; the rate of mortality being only two and one half per cent.

The diagram affords no comparative data for this region. The United States Census presents the naked maps, without even designating the counties, and without any comments or accompanying remarks.

DEATHS FROM CONSUMPTION IN CALIFORNIA

Compiled from U.S. census 1870

<i>Under 250</i>	<i>in 10,000 deaths</i>		
<i>from 250 to 550</i>		"	"
" <i>550 " 900</i>		"	"
" <i>900 " 1400</i>		"	"
" <i>1400 " 2000</i>		"	"
<i>over 2000</i>		"	"



DEATHS FROM INTESTINAL DISEASES IN CALIFORNIA.

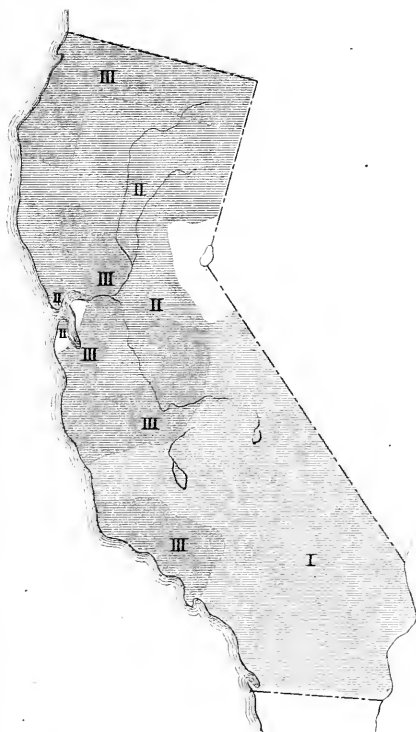
Compiled from U. S census 1870.

Under 400 in 10,000 deaths

from 400 : 250 " "

" 250 : 550 " "

" 550 : 900 " "





Compiled from U.S. census 1870.

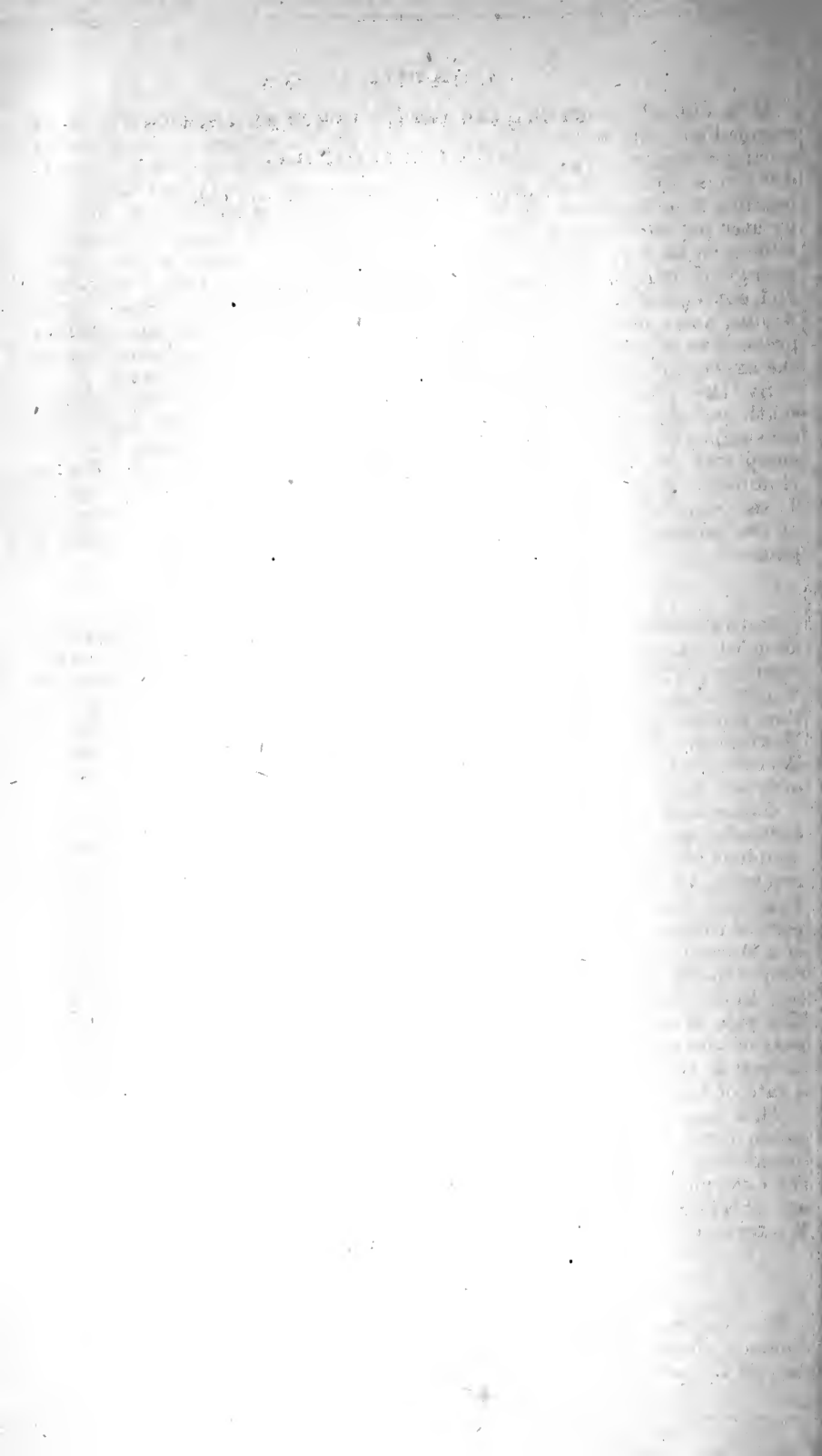
from 100:250

„ 250:550

„ 550:900

I
II
III





It is difficult to explain the relative prevalence of consumption, as mapped out, unless by the fact that the air, on account of its coldness during Summer as well as Winter, is more completely excluded from the dwellings within the reach of the chilling oceanic winds, and where the maximum mortality is found. In this way, we would account for the greater prevalence of consumption in New England than farther south, where, as is here also shown on the map, by welcoming a free interchange of the outer with the inner air, a purer atmosphere is maintained, and, consequently, a greater exemption from lung diseases is experienced. Alpine, and other cold, tonic climates have of late been recommended as preventive of consumption, and the reasons for this afford some clue to the exemption of the northern part of the State from this disease.

By the vital statistics of the census it appears that the farther south and the farther from the seacoast the less the percentage from consumption. This indicates as the region most favorable for consumptives in the United States, that extending along the Rocky Mountains from Colorado south through New Mexico and Western Texas into Mexico. I shall allude to this subject again, when treating of the sanatory influences of some of the Summer resorts and watering places.

INTESTINAL DISEASES. (*Green tints.*)

In the census map the deepest green tint (III), representing the maximum of intestinal diseases, is made to cover the northern and north-western portion of the State, and the lower part of the Sacramento Valley; also, San Joaquin, Stanislaus, and Santa Clara Counties, and that portion of Contra Costa and Alameda Counties in the Livermore Mountains. Further south it includes Fresno, Monterey, and Santa Barbara Counties: the rate of mortality being from five and a half to nine per cent.

Our mortality table (No. 1) shows a correspondence with respect to the region of maximum mortality, although the rate is shown to be nearly double in all the points mentioned. The next deepest green tint (II), representing two and a half to five and a half per cent, embraces the San Francisco peninsula, Marin, Sonoma, and Mendocino Counties; the upper part of the Sacramento Valley, Santa Cruz, and a portion of Santa Clara and Merced Counties. In this case, also, our mortality table shows the rate of mortality to be much higher. The lightest green tint (I) includes San Luis Obispo County, and all the southeastern portion of the State. The rate of mortality is from one to two and a half per cent. The lower part of the peninsula of San Francisco, and the country around the bay, as well as the mountain region about Lake Tahoe, is represented to have a rate of less than one per cent.

This map shows that, just where the chilling Summer winds of the ocean prevail in all their intensity—driving in the blood upon the vital organs—there intestinal diseases prove most fatal. For similar reasons, the extreme northern part of the State—where the cutaneous secretions are checked and suspended by the cold, moist air of our mountain Winters—is shown to be most liable to enteric forms of disease.

MALARIAL DISEASES. (*Reddish brown tints.*)

The deepest reddish brown tint (III) in the map representing malarial diseases, shows the maximum mortality to occur in Sacramento, Amador, El Dorado, and Placer Counties; also, the northern part of the Sac-

ramento Valley and all the northeast corner of the State; the rate of mortality being from five and a half to nine per cent. In this respect, the map coincides closely with the data procured and represented in Mortality Table No. 1. In that table, it will be perceived, that the mortality in Marysville, from these diseases, is fifteen per cent; in Placerville, about the same, and in Colusa and surroundings, about twelve per cent. This, it would appear, is rather higher than the rate of mortality represented in the census map. The next degree of tint (II) includes Marin, Solano, Napa, and Yolo Counties, Nevada and Sierra Counties in the mountains, the lower part of the San Joaquin Valley, and the region about the bay, with the exception of the peninsula of San Francisco; the rate of mortality being from two and a half to five and a half per cent. In these respects, the census map coincides with the rate of mortality shown in our mortality table.

The highest tint (I) is made to include the peninsula of San Francisco, all the northwest coast country, and all the southern half of the State; the rate being one per cent. This does not coincide with our table, which shows generally a rate of about four per cent in the same localities.

The census map discloses the fact that the whole State is more or less subject to malarial diseases, in a slight degree. The broad level plains of the Sacramento and San Joaquin Valleys are specially proclivous to ague and other fevers, and it is very questionable whether the extensive systems of irrigation, now under discussion, will not add to their insalubrity. Residents of the low, rich lands in the interior of the State, where the Summers are long and hot, are liable to be much debilitated in Autumn, from the continued heat, even if they escape a positive attack of fever. The superaddition of moisture, under these conditions, must prove detrimental to the public health.

In the more elevated northwestern portion of the State, malignant or congestive fevers, generally attributed to virulent malaria, add to the sum of mortality. A physiological reason, however, may be found for the occasional development of this form of disease, in the fact that a dry, tonic climate stimulates the circulation and quickens the respiration, at the same time increasing the secretions of the skin and liver, and diminishing the amount eliminated from the kidneys. The diseases, which naturally follow, are remittent, intermittent, and other fevers, which are aggravated by malaria.

Throughout the whole State there must continue to be more or less of malaria for centuries to come, if not for all time. Much of the land, especially in the vast tule regions, is of such a nature that probably it can never be effectually drained, and could not be profitably cultivated even if drained. Nevertheless, in careful and thorough drainage lies our only hope of escape from malarial influence.

HOSPITALS, ASYLUMS, PUBLIC INSTITUTIONS, ETC.

Among other requirements of the organic law, it is directed that "the State Board of Health shall place themselves in communication with the Local Boards of Health, the hospitals, asylums, and public institutions throughout the State, and shall take cognizance of the interests of health and life among the citizens generally. They shall make sanitary investigations and inquiries respecting the causes of disease, especially of epidemics, the source of mortality, and the effects of localities, employments, conditions, and circumstances on the public health; and they

shall gather such information in respect to these matters as they may deem proper for diffusion among the people."

In the discharge of the different duties here set forth, which naturally interlock with each other, and refer to subjects of which a competent knowledge is necessary in order to advisement as to the state of the population in health and disease, and as to unwholesome conditions and their abatement, I would state that there have been published regularly every month in the *Pacific Medical and Surgical Journal*, a tabulated statement of the prevalent diseases and mortality. The data for these reports are procured not only through the instrumentality of such Local Boards of Health as are in active existence, but also by means of the coöperation of various medical gentlemen in diverse regions of the State. These statements, respecting the mortality and its causes, are always accompanied with such remarks and advice as circumstances seem to require and render necessary for protecting the health and lives of the people against epidemic visitations, in accordance with the well defined truths of hygienic science and preventive medicine. Copies of the *Journal* containing these reports are regularly sent to the leading newspapers of San Francisco and Sacramento, in order that they may have a more wide-spread publication; and during periods of impending danger, as have occurred in February, eighteen hundred and seventy-two, from smallpox, and more recently from cholera, special tracts and other circulars have been printed and distributed, for the diffusion of more correct information and advice among the community. Besides these measures, public lectures have been delivered by the members of the Board, in San Francisco and Sacramento, from time to time, on various sanitary questions, some of which will be found in the Appendix of this report.

The Legislature, at its last session, appropriated seven hundred and twenty-four thousand dollars for the public charities of the State, of which four hundred and thirty thousand dollars were for insane asylums, one hundred thousand dollars for State Reformatory or Branch State Prison, seventy-two thousand dollars for the Asylum for the Deaf, Dumb, and Blind, one hundred thousand dollars for benevolent organizations in San Francisco, and twenty-two thousand dollars for those outside of that city.

In addition to these liberal donations, the Legislature has also appropriated for the support of the orphan asylums in the State, sustained by charitable institutions, fifty dollars for each full orphan, and twenty-five dollars for each half orphan, per annum, cared for by them. The same power which has thus endowed these charities, has also made it the duty of this Board, as has already been stated, according to section second of "An Act establishing a State Board of Health," to "place themselves in communication with the hospitals, asylums, and public institutions throughout the State," and make a report thereof at each biennial session of the Legislature.

In the discharge of these duties, circulars and letters have been addressed to all the known public institutions and charities, including the various county hospitals, asking for reports and other information, the results of which will be found in the table and context which here follow. Although reports from some of the public institutions that have shared the State appropriations have failed to reach this office, still it will be seen that a sufficient number have been received to enable us to speak favorably of the benefits that have generally accrued from the largess of the State, especially in the results of hospital treatment.

TABLE

Exhibiting the number of indigent sick, with the results, in charitable institutions, and the percentage of deaths to the cases; also, the total average percentage of deaths.

NAME AND LOCATION OF EACH HOSPITAL.	No. of months reported.....	Total admitted	Discharged cured	Discharged	Died	Percentage of deaths... ..	Remaining under treatment.	Physician.
Sacramento County Hospital, Sacramento.....	12	627	444	38	46	7.3	99	G. A. White, M. D.
Central Pacific Railroad Hospital, Sacramento	12	776	711	.....	25	3.4	30	A. B. Nixon, M. D.
Colusa County Hospital, Colusa.....	12	48	40	.....	4	8.3	4	J. M. Banks, M. D.
San Bernardino County Hospital, San Bernardino....	12	36	.....	.....	1	2.8	.....	J. C. Peacock, M. D.
Fresno County Hospital, Millerton.....	12	22	14	.....	5	22.7	3	Lewis Leach, M. D.
Siskiyou County Hospital, Yreka.....	12	28	20	.....	3	1.7	5	D. Ream, M. D.
Los Angeles County Hospital, Los Angeles.....	12	164	133	.....	22	13.4	9	H. S. Orne, M. D.
Sierra County Hospital, Downieville.....	12	34	21	.....	5	23.5	8	George C. Chase, M. D.
Napa County Hospital, Napa City.....	12	71	44	.....	15	21.5	12	M. B. Pond, M. D.
Plumas County Hospital, Quincy.....	12	72	70	.....	2	2.7	.....	I. S. Carter, M. D.
Placer County Hospital, Auburn.....	12	78	69	.....	9	11.8	3	A. S. Dubois, M. D.
San Joaquin County Hospital, Stockton.....	12	147	100	.....	20	1.3	27	Chas. A. Ruggles, M. D.
Solano County Hospital, Suisun.....	12	67	45	.....	10	15.0	12	S. D. Campbell, M. D.
State Prison Hospital, San Quentin.....	12	131	99	.....	8	6.1	24	T. W. Randle, M. D.
Shasta County Hospital, Shasta.....	12	74	42	.....	10	1.3	22	Benjamin Shurtleff, M. D.
Humboldt County Hospital, Eureka.....	12	103	.....	.....	3	2.9	.....	E. L. Barber, M. D.
Inyo County Indigent Sick, Independence.....	12	22	6	.....	3	12.7	3	C. B. White, M. D.

Alms-house, San Francisco.....	12	103	62	1	36	34.9	4	S. R. Gerry, M. D.
San Francisco City and County Hospital	12	2,920	1,282	1,047	237	8.1	360	W. M. Lawlor, M. D.
Calaveras County Hospital, San Andreas.....	12	67	45	.....	9	13.2	13	E. B. Robertson, M. D.
Stanislaus County Hospital, Knight's Ferry.....	12	26	17	.....	2	7.7	7	Joshua Marks, M. D.
San Mateo County Hospital, Redwood City.....	12	37	26	.....	3	8.1	8	C. A. Kirkpatrick, M. D.
Mariposa County Hospital, Mariposa.....	12	18	9	.....	4	22.2	5	J. T. Turner, M. D.
San Diego County Hospital, San Diego.....	12	27	15	.....	8	27.6	4	T. C. Stockton, M. D.
Monterey County Hospital, Castroville.....	12	19	12	.....	4	21.0	3	E. J. Martin, M. D.
Alameda County Hospital, San Leandro.....	12	172	119	.....	13	2.3	35	C. S. Coleman, M. D.
State Insane Asylum, Stockton.....	12	1,596	270	15	188	11.7	1,123	G. A. Shurtleff, M. D.
Yuba County Hospital, Marysville	12	125	101	.....	12	10.5	12	C. C. Harrington, M. D.
Sacramento County Dispensary, Sacramento.....	12	612	440	.....	3	0.4	169	C. H. Fisher, M. D.
State Woman's Hospital, San Francisco.....	12	58	38	10	.....	.....	10	John Scott, M. D.
San Francisco Female Hospital.....	12	216	193	.....	3	1.4	20	C. T. Deane, M. D.
Alameda County Infirmary, Alameda.....	12	143	70	49	18	12.6	6	C. S. Coleman, M. D.

As with a similar table, published in the last report of this Board, the above compares most favorably in its results with the showing of the best ordered hospitals in the world. Taken in connection with the fact of their crowded condition, and short allowance of cubic space for air to each patient, and necessarily defective ventilation, especially in the instances of the Lunatic Asylum, the hospital wards of the San Francisco Almshouse, and of the State Prison, and most of the County Hospitals, nevertheless these results afford the most unequivocal evidence of the benefits that have accrued from their skillful medical administration. In order to afford some criterion for forming a judgment as to what has just been premised, the following classified abstract of the returns from one hundred and six English hospitals is here inserted:

Hospitals.	Number of special inmates on the 8th April, 1861....	Average number of inmates in each hospital....	Number of deaths registered in the year 1861.....	Mortality per cent on inmates.....
In 106 principal hospitals of England.....	12,709	120	7,227	56.87
24 London hospitals.....	4,214	176	3,828	90.84
12 Hospitals in large towns.....	1,870	156	1,555	83.16
25 County and unimportant Provincial Hospitals.....	2,248	90	886	39.41
30 Other hospitals.....	1,136	38	457	40.23
13 Naval and military hospitals.....	3,000	231	470	15.67
1 Royal Sea-bathing Infirmary (Margate).....	133	133	17	12.78
1 Dane Hill Metropolitan Infirmary (Margate)....	108	108	14	12.96

The first thing that strikes our attention on examining this table, is the strong contrast presented between the death-rate of the English hospitals and that of ours—verifying what has been so often advanced respecting the agglomeration of the sick under one roof, and especially in the polluted atmosphere of large cities. Compared with our hospitals, the results are simply enormous, and are well calculated to raise grave doubts as to whether or no the function of metropolitan hospitals was to kill the sick, rather than to cure them. It will be seen that the English hospitals are grouped according to locality. Now, let us compare—as the worthy to be canonized Florence Nightingale, who compiled the table, has done—three of these groups with each other. We have twenty-four London hospitals, affording a mortality of no less than 90.84 per cent—very nearly every bed yielding a death in the course of the year. Next, we have twelve hospitals in large provincial towns, yielding a death-rate of 83.16 per cent; and there are twenty-five county hospitals in country towns, the mortality in which is no more than 39.41 per cent. However, the great differences in these death-rates may be explained: It cannot be denied that the most unhealthy hospitals are those situated within the vast circuit of the metropolis; that the next lower death-rate takes place in hospitals in large manufacturing and commercial towns, and that by far the most healthy hospitals, are those of the smaller country towns.

It may now, with much justness, be asked, if these facts be so, why is it that the very converse takes place in California, as is shown

in our table. The solution of this hospital problem is readily found in the analysis of the data. In reverting to these, we find that in the County Hospitals of Fresno, Sierra, Napa, Mariposa, San Diego, and Monterey, where the death-rate was the largest (larger than that of any of our city hospitals, except the Almshouse of San Francisco), three of the five deaths, in the first named, were from fractures of the skull and cut throat; four of the five deaths in the second, were from alcoholism and traumatic hemorrhage; five of the fifteen deaths in the third, were from paralysis and cancer; two of the four deaths in the fourth, were from inanition and cancer; five of the fifteen deaths in the fifth, were from phthisis and gunshot wound; and all of the four deaths in the sixth, from phthisis and dropsy. No one who brings any ordinary powers of observation to bear on disease and death, will fail to perceive that all these deaths were absolutely unavoidable (some of them being *in articulo mortis* when admitted into these hospitals), and that to compute the curative measure for any hospital—especially a small one—by dividing such deaths by the number treated, would be altogether unfair and illogical; but deduct these deaths, as should be done, from those in the five County Hospitals just enumerated, and the position above taken holds good—as well with the California hospitals as with those of England—"that by far the most healthy hospitals, are those of the smaller country towns." The reasons are obvious. In the country hospitals the patients stand some chance of getting pure air to breathe; whereas, in large cities, what medical man does not know that in many cases of slight fever, received into hospital, the fever may pass off in less than a week, and yet the patient, from the foul state of the atmosphere around him, may not, if ever, be restored to health in less than eight weeks. These reasons, for the high death-rate in large city hospitals, apply with special force to only one of those enumerated in our table.

It will be noticed that the greatest mortality was in the hospital department of the San Francisco Almshouse, which institution was made to show, in our former report, a very low rate of mortality. This was caused by calculating the death-rate upon the basis of the total number of residents in the Almshouse, and not of those in the hospital alone, as has now been done. The patients admitted here are from other hospitals, as well as from the wards of the Almshouse—paupers—broken down in health and spirits, who have been sent here to eke out their miserable existence, without any prospect of ultimate relief or delivery from their hopeless condition. Dr. Gerry states that, even "those enumerated as discharged, for the most part, return to their wards in the house." Having already, in our former report, spoken favorably of this institution, with regard to its administration, locality, and surroundings, I can only account for the comparatively high death-rate, by the moral causes just stated, superadded to the *agglomeration of a large number of sick under one roof*.

This overcrowding of nearly all our public charities and institutions, and failure to provide a due allowance of cubic feet of air for each inmate, alone prevent our hospitals, generally, from exhibiting a lower death-rate than those of any other State or country in the world. To correct this evil, the authorities in our metropolis have taken a step in the right direction, by the passage of an ordinance punishing every person who does not allot to himself or herself five hundred cubic feet of air in the sleeping apartment. Up to this time, however, all prosecutions for the violation of this law seem to have

been directed exclusively to the Chinese. The original intention of awarding five hundred cubic feet of air to each individual in a sleeping apartment was to fix a standard for the construction of hospitals, and the size of the building, and its apartments, was made to correspond in that proportion to the number of patients admitted. No one ever dreamed that it should be applied as a hygienic rule for every-day life, or adopted as a guide for legislative action. A room ten feet high and seven feet square will give four hundred and ninety cubic feet of air, and is sufficient, under ordinary circumstances, for one person; but if that room be void of ventilation, the atmosphere will become so vitiated in the course of twenty-four hours as to be absolutely poisonous. It is not so much a question of cubic feet, but one of ventilation, which is really at issue, and it would seem from present appearances, as if it were intended that the cubic feet principle was to be applied solely to the Chinese portion of our population. As, however, our city authorities have taken the initiative, it is respectfully suggested that our Legislature would enact a State law, requiring, at least, all the State institutions to be regulated by a similar five hundred cubic feet of air statute. That such a law is imperiously required, we will point, as an example, to our State Prison. In a recent report, showing the condition of affairs at San Quentin, the Warden says: "It will be seen that in the old, or stone prison, there are seven large rooms, into each of which are crowded from thirty to forty-two convicts. It is unnecessary for me to say that this system of huddling together, in one room, over forty persons, convicted, perhaps, of as many different crimes, is entirely wrong, and reflects severely upon the law-making power of the State. Under no circumstances, in any well regulated prison, should more than two be confined in the same cell or room. It must be apparent to those even who have but little or no knowledge of the management of State prisons, that such a system must fail in attaining the objects sought by imprisonment—the reformation of the convict. We have received no report from any of the prisons in the United States presenting such a state of facts. With the present number of convicts, at least four hundred new cells are absolutely necessary to make this what a prison should be." These suggestions were made when the prison contained eight hundred and eighty prisoners. Now the number has increased to nine hundred and five, with prospects of numerous accessions within the next twelvemonth, and the seven rooms are populated as follows: Room A, thirty-three; room 1, twenty; room 2, thirty-nine; room 3, forty-one; room 4, forty-four; room 5, thirty-nine; room 6, forty-four. Room 1 is only thirteen by twenty-four feet. The cells in which four men are placed were built to contain but three. Comment is unnecessary!

In farther confirmation of our views, we would also refer to a communication from Dr. Charles Blach, City Physician to the San Francisco Board of Health, written since the passage of the five hundred cubic feet of air ordinance, in which he states he is informed that it is proposed to close the Branch Jail, and to transfer the prisoners confined there to the County Jail proper. He protests against such a change, believing it would be false economy, and inhumanity to those who are placed by law in charge of the Sheriff. There are in the two jails two hundred and eight persons, and the daily average of inmates during July was two hundred and sixty-five. The Broadway Jail contains seventy cells, four of which are unfit for use. The cells contain only about four hundred cubic feet of air each, and from two to five prisoners occupy each cell. The space is too limited for the present inmates,

and an addition of those from the Branch Jail will be likely to produce typhus and typhoid fevers. The matter will be worse in the Winter season, because then the jail is always well filled. The doctor suggests that it is cheaper to keep prisoners healthy, by means of ample space and pure air, than to place them in crowded quarters and vitiated atmosphere, thus bringing on sickness, and then medicate them to a sound condition.

While thus calling attention to the general neglect of hygienic architecture in most of the public buildings that have come within the range of our perfunctionary duties, it affords me pleasure to refer, satisfactorily, to the recent structure that has been erected for the San Francisco City and County Hospital. Located in the outskirts of the city, the grounds cover nearly ten acres, and are sufficiently elevated to insure efficient drainage. The pavilion plan has been adopted. Several individual structures, most of them at considerable distance from each other, but connected by a long, covered corridor, unite to form the hospital. It is designed to have, eventually, twelve pavilions, to be built in pairs, opposite each other, on either side of the long corridor and parallel to the main buildings—the first pairs, on either side, being one hundred feet from the main buildings—the second one hundred feet from the first, and the third one hundred feet from the second. Six pavilions are considered sufficient for present purposes. With the most generous allowance of space, they will contain three hundred and eighty-four patients. The very successful results of this hospital have been already stated in our table. We have only to add, that the following recent finding of the Grand Jury, meets with our hearty concurrence:

“*The County Hospital* presented a neat and clean appearance. The buildings are admirably adapted for the purposes used, being well lighted and ventilated, but very deficient in bathing accommodations. As cleanliness of person is indispensable to a speedy restoration to health, we recommend that bath tubs be added to each ward.

“We would recommend the construction of suitable rooms for surgical operations, which are now performed in the wards occupied by patients suffering from all the various diseases, many of whom can scarcely fail of being unfavorably affected thereby.”

Besides the hospitals that have been considered, there remain to be mentioned a few institutions of a similar character, but devoted to special objects. The *State Woman's Hospital* receives only those with diseases peculiar to women. It has only restricted accommodations (eighteen beds), and it is tasked to its utmost capacity, as not a bed is ever at any time vacant. All who are able, are expected to pay; but a limited number of those unable to do so, are received gratuitously. The last State appropriation was seven thousand five hundred dollars. The institution is under the charge of Dr. John Scott, and, being well located, appears to be admirably adapted to the purposes for which it is designed. Of the fifty-eight cases already enumerated in our Hospital Table, thirty-three were Protestants and twenty-five were Catholics. The residence of thirty-seven was San Francisco, while twenty-one came from all parts of the State, viz.: Douglas City, Dry Creek, Humboldt, Mayfield, Marysville, Mokelumne Hill, Napa County, Nevada, Oakland, Stockton, and Weaverville, and one from Salt Lake City—out patients have not been included, their attendance having been irregular and unsatisfactory.

We have to deplore the limited accommodation which this hospital affords, as it has only eighteen beds, and the cases admitted being not only grave, but of an essentially chronic nature, patients average a stay of about four months each in the house. This will explain the limited number of admissions, which would be quadrupled if we had extended accommodations. But we hope to see this matter soon remedied, as the Trustees expect to be able shortly to erect a hospital to contain about fifty beds.

The San Francisco Female Hospital, of which Dr. C. T. Deane is the Physician, received ten thousand dollars from the appropriation of the State's bounty at the last session of the Legislature. As the certificate of incorporation shows, this institution was established for the care of sick females, and to provide for the gratuitous accouchment of pregnant women. There were, therefore, one hundred and two births—boys, sixty; girls, forty-two—in the institution during the year, which are not enumerated in our table. While the most commendable neatness and order is seen in all the appointments of this hospital, the same narrow and contracted provisions for cubic space of air rule here as they do in all our public charities, except the San Francisco County Hospital; and which are chargeable to the meagerness of the funds appropriated to their support and establishment.

The San Francisco Lying-in Hospital and Foundling Asylum was incorporated for the benefit of unfortunate married, or unprotected single women, and for the care and protection of such children as may be born in said hospital, and foundlings, without distinction of race or nationality. The specialty of the institution will be seen at once. It will be appreciated that it differs from the other two charities above reported, in receiving no cases of disease whatever. It provides a room for each pregnant woman, of which it can accommodate twenty-one. It is expected that the institution will be supported by contributions, donations, and receipts from patients when able to pay. Seven thousand and two hundred dollars were appropriated to its use by the last Legislature.

Following is the report of the Medical Superintendent, Dr. B. F. Hardy, for eighteen hundred and seventy-two:

During the period named, one hundred and forty-one infants came under our care, and seventy-four mothers; numbering in all, two hundred and fifteen. Seventy-seven of the children were born in the hospital, and sixty-four infants were brought to it—eighty males and sixty-one females—parentage unknown.

Seventy of the mothers were primiparas, and gave birth to seventy-two children; all natural labors. Sixty-nine of them were unfortunate, and, but for this accident, respectable girls, representing every grade of respectable society; from the wealthiest and best educated to the poor and uneducated. Several of them have since married, with every probability of making useful women and good wives.

Many of the children born in the institution, as well as some of those left by outside parties, of both sexes, have been adopted by responsible and good persons, and appear as promising, on an average, as those born in wedlock, under parental care. The parties adopting them enter into legal written obligations to take them as their own, give them their own name, educate them as though born of their own bodies, and make

them heirs of their estates—promising, that if children afterwards should be born to them, they shall share equally and alike with them.

I, therefore, can see no good reason why these little outcasts may not become as useful to the State as those children ushered into the world more favorably and legitimately.

I trust all will perceive that the main features in our work are to serve a class of mothers that, without our aid, would seek the abortionist, in whose hands the lives of a portion of them would be sacrificed, and the remainder pass from the abortionist to the procuress' toils, to a life of infamy, each to demoralize and disease their scores, increasing the expenses of the city and State to an incalculable amount. To illustrate, I will only allude to one notorious instance that has occurred—known to all—within the last two years. Besides saving the life and character of mothers, their relatives and friends are saved from suffering and disgrace. It is possible that nine out of every ten of the one hundred and forty-one children mentioned, but for our asylum would, if they had not been killed in utero, been thrown into the bay, buried in the sandhills, or other places that might be named.

We wish it understood that we are engaged in a peculiar work that does not interfere with, neither can it be performed by, lying-in wards of any general hospital. Experience proves, that with the class of persons that come to us, if kept from exposure, we must receive them during the sixth month of pregnancy, and keep them, on an average, one month after delivery, which together will average from three to four months residence in the hospital; whereas, with all other classes of lying-in women, one month may be the average time, so that three to four times as many patients could be received and delivered within an equal number of rooms. I will here state that we have twenty-two rooms occupied by mothers, infants, and employés. These are inadequate. The rent alone of these is one hundred dollars (\$100) per month. The monthly contingent expenses for the past year have averaged—without any compensation to physician or officers—about six hundred dollars (\$600); of which three hundred dollars (\$300), or one half, we receive from the State. The number of mothers at present in the Hospital, ten; children, thirteen.

In order to meet the demands in the interest of mothers and children, we have engaged adjoining premises—until we can build for ourselves—that will enable us to double our work, and greatly improve the facilities for promoting the health and comfort of all inmates, more especially the foundlings. This will double our rent, and probably all other expenses.

It is hoped, therefore, the next Legislature will appropriate a liberal sum for a building fund, besides a sufficient sum for the contingent expenses. The city has been liberal and given us ample and suitable grounds for the wants of the institution for a quarter of a century to come. The want of funds to erect suitable buildings has become urgent. Two hundred dollars (\$200) for rent alone could be saved to the institution, had we buildings of our own.

Almost every county in the State has shared in the benefits of the institution, yet we have not been able to receive all who applied for admission, and whom we should have received, but for our limited funds and premises. We asked this of the former Legislature, but owing to the influence of jealous parties on legislative committees, were prevented from receiving the aid we asked, consequently we have been restricted

and cramped in our efforts, and confined to premises inadequate to the demands made of us.

BENJ. F. HARDY, M. D.,
Attending Physician and Surgeon.

Besides the institutions enumerated above, there are several others, both of a public and private nature, which have been established and endowed through the munificence of private citizens, as well as of cities, counties, and States, and whose names indicate their special uses. The compiler of the San Francisco Directory for eighteen hundred and seventy-three, who is best able to form a correct opinion, says that this city offers accommodation for nearly a thousand patients; that over five thousand persons availed themselves of their advantages during the year eighteen hundred and seventy-two, of which four hundred and fifty died; and that the average number of patients under treatment was nearly seven hundred.

STATE INSANE ASYLUM.

Following is a synoptical report of the Superintendent of the Insane Asylum of the State of California for the year ending October first, eighteen hundred and seventy-two.

Resident officers—G. A. Shurtleff, M. D., Medical Superintendent; I. S. Titus, M. D., Walter R. Langdon, M. D., Assistant Physicians. Directors—Edward Moore, President; Donald McLennan, O. Harvey, E. E. Thrift, Henry S. Austin; P. V. Batte, Treasurer and ex officio Secretary.

	Males.	Females.	Totals.
Number of patients October 1st, 1871.....	786	304	1,090
Number admitted during the year ending October 1st, 1872.....	359	147	506
Total.....	1,145	451	1,596
Number discharged recovered.....	176	64	240
Number discharged improved.....	16	14	30
Number discharged unimproved.....	3	.....	3
Number died.....	144	44	188
Number eloped.....	10	2	12
Discharged, died, and eloped.....	349	124	473
Number of patients remaining October 1st, 1872.....	796	327	1,123

Number of admissions, recoveries, deaths, etc., for twenty-two years.

YEARS.	Admissions	Recoveries.....	Discharged uncured...	Deaths.....	Escaped.....	Number resident close of each year.....	Whole number treated	Per cent of recoveries.	Per cent of deaths
1851	13	6	.....	1	.....	6	13	46.15	7.69
1852	124	50	.....	10	.....	62	130	40.32	7.69
1853	160	108	.....	12	.....	103	222	67.50	5.40
1854	202	150	.....	21	.....	134	305	74.00	6.89
1855	214	168	.....	18	.....	162	348	78.50	5.20
1856	210	126	.....	23	.....	172	382	60.00	6.02
1857	206	81	.....	28	.....	188	378	39.32	7.33
1858	244	112	.....	32	.....	273	432	45.90	7.41
1859	276	112	.....	49	.....	370	549	40.58	8.91
1860	248	123	.....	54	10	417	618	49.59	8.73
1861	198	154	34	33	14	416	615	77.77	5.36
1862	301	127	14	65	12	499	717	42.19	9.06
1863	252	105	17	47	12	583	751	41.67	6.26
1864	219	101	25	82	12	581	802	46.12	10.22
1865	268	93	15	82	27	632	849	34.70	9.66
1866	279	131	13	62	12	693	911	46.95	6.81
1867	313	125	14	89	9	769	1,006	40.00	8.80
1868	387	146	13	134	10	853	1,156	37.73	11.59
1869	482	225	16	159	15	920	1,335	46.68	11.91
1870	562	221	36	156	22	1,047	1,482	39.32	10.55
1871	523	245	36	176	23	1,090	1,570	46.84	11.21
1872	506	240	33	188	12	1,123	1,596	47.43	11.78
Totals	6,187	2,949	266	1,521	.....	.....	.....	.....	.....

RECEIPTS.

Balance October 1st, 1871.....	\$13,432 48
Received from Controller's warrants.....	188,270 05
Received for board and clothing.....	7,064 09
Received from State of Nevada for board and clothing.....	1,159 13
Received for furniture.....	300 00
Received from other sources.....	69 00

Total ..	\$210,704 75
Disbursements, as per vouchers on file.....	207,097 61

Balance in treasury September 30th, 1872.....	\$3,607 14
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INDEBTEDNESS.

Bills of supplies.....	\$8,267 13
Material and pay roll for improvements.....	949 22
Pay roll of employés.....	4,788 34

Total	\$13,954 69
Deduct cash on hand.....	3,607 14

Indebtedness September 30th, 1872.....	\$10,347 55
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Of all the eleemosynary institutions already noticed, so creditable to the enlightened humanity of our State, none have received so much consideration from our Legislature, or required so great an expenditure of the public treasure, as our State Lunatic Asylum.

On the first of October last, as revealed in the above table, the number of insane in California was one thousand one hundred and twenty-three. There is therefore one lunatic to every four hundred and ninety sane persons. This shows the largest ratio to population of any State in the Union, with the single exception of Vermont.

It is a startling announcement. Let us look at the matter boldly, inquire into the causes and remedies, and calculate the weight of the burden thus laid upon us, so that we may the more intelligently prepare to bear it, if not to lessen its oppressiveness. To know the extent and nature of an evil is the first step towards its abatement.

From the date of the announcement of the discovery of our marvelous gold fields, the enterprising and the adventurous of every country, race, religion, and character, have flocked hither to form the most cosmopolitan State in the world. On a people of such heterogeneous elements, exposed to all the evils incident to change of climate, habits, and modes of life, isolated, without sympathy, and deprived of all home influences, the shock attendant upon the sudden acquisition of wealth, with its unbounded hopes, its sudden reverses and short-lived triumphs, is well calculated to break some link in reason's chain, and throw into confusion even the best balanced properties of mind. And when to these reasons is superadded the speculative and gambling spirit in our community, taken in connection with the prevailing vice of intemperance, and all the evils following in its train, and unequalled in any part of the world, it is not surprising that insanity has increased at such a fearful rate. This increase has been steadily going on, as shown in the above table, for twenty-two years, with slight fluctuations, until the years eighteen hundred and sixty-two and eighteen hundred and seventy.

"Why the year eighteen hundred and sixty-two should have developed one hundred and three, and the year eighteen hundred and seventy, eighty cases in excess of their immediate predecessors, is a question involved in too much mystery to be satisfactorily answered. It leads to the suspicion that insanity, like other diseases, may become epidemic when the causes tending to its development are rife in the community. The exciting or developing causes in those years may have been increased by the excitements, fears, griefs, animosities, accidents, losses, etc., attending the inauguration and prosecution of the American conflict, in eighteen hundred and sixty-two, and that of the Franco-German war in eighteen hundred and seventy. The admissions to the asylum in eighteen hundred and seventy-one were five hundred and twenty-three, or thirty-nine less than the previous year, while eighteen hundred and seventy-two gave the asylum five hundred and six patients, being seventeen less than in eighteen hundred and seventy-one, and fifty-six less than in eighteen hundred and seventy.

"This might lead to the conclusion that the insane has reached its greatest proportion to the sane population of the State, and that we had already arrived at that period when the accumulation of old, chronic, and incurable cases had reached its highest proportional point. I sincerely hope that such may prove to be the case; for while we know that some causes, in addition to those existing in most other countries, seriously affect us, still the ratio of the insane to the population in Cali-

fornia is less than that known to exist in France, England, Scotland, Ireland, and some other countries and States. These special causes will, it is to be expected, gradually disappear; the excitements of life will diminish; it is devoutly to be hoped, too, that the use of poisonous alcoholic compounds, that the ingenious contrivances of civilization have furnished to man in such tempting forms, will also decrease with the increase in quantity and improvement in quality of our native wines, as well as under the better moral feelings of the future." (1)

THE BURDEN OF INSANITY.

If in an army of a million, to paraphrase a proposition from a high source (2), every four hundred and ninetieth soldier were insane, and not only incapable of self-guidance, but requiring the care and attention of another soldier, those four thousand men would cause a heavy drain upon the resources of that army, and prove a constant source of embarrassment in its operations. Such a drain upon the resources of the State—such an embarrassment to social progress—is the existence of insanity at present in California.

"But this comparison sets forth only a small part of the evil, because the burden is upon our hearts as well as upon our resources. It causes sorrow and mourning, which not even the hand of time can heal, as it heals sorrow for the departed; because the insane, though socially dead, will not depart out of our sight, but wander, ghosts of their former selves, and appeal to us for sympathy as well as succor."

While our statistics show that the insane have increased in our borders more rapidly than in any other country during the same period of time, and necessarily have caused a proportional outlay, it is a gratifying fact to be able to state, on the authority of our able Commissioner in Lunacy, that California is the only State in the Union, if not the only government in the world, that has never refused admission to a single person who has sought to enter her asylum. This, coupled with the remarkable fact, that while only two fifths of the population are of foreign birth, two thirds of the insane were furnished by them, affords indubitable evidence of the unbounded liberality of the policy, which has ever characterized the American people, and this, in a measure, accounts for the satisfactory results. There are but few asylums in the United States that show so large a percentage of recoveries, while the average in all is far below ours. Of the six thousand one hundred and eighty-seven committed to the asylum—as our table shows—since eighteen hundred and fifty-one—the first year of its inauguration—to October, eighteen hundred and seventy-two, it has given back to society two thousand nine hundred and forty-nine restored to health and usefulness. It has also been instrumental in taking care of two hundred and sixty-six, who, although they did not fully recover their reason, still have been returned partially relieved, to their friends and families, who have thus been spared the burden of their care for a greater or less length of time. Besides all this, it has afforded much peace and comfort to a large and troubled household during a period of twenty-two years, in taking charge of and giving Christian burial to one thousand eight hundred and fifty-one incurables.

(1) "Insanity in California," Transactions of the State Medical Society, 1873, by E. T. Wilkins, M. D., late Commissioner in Lunacy.

(2) Fifth Annual Report of the Board of State Charities of Massachusetts.

Such record proves that however much the asylum may have failed to accomplish all that was expected by the Legislature, it has certainly, through its officers, prosecuted the great Christian charity for which it was established, with a considerable degree of success. It has freely opened its doors to the reception, from families and friends, from hospitals and prisons, from the streets and by-ways, of the sick and the east down, of the suicidal and homicidal, of the inebriate and the debauchee, when lost to all hope and self-respect, and restored back to the State nearly one half of all those, in the healthful possession of their mental and physical faculties. More than this, it has relieved many families, relatives, and friends from continual danger, dreadful anxiety, and the necessary constant watching, which would involve the loss of their time and services to the State. In the presence of such considerations, pecuniary questions become of secondary importance.

The reason why so large a percentage of recoveries occur in our asylum is because the majority of the patients are sent there at an early period after the accession of the disease—they are sent there because it is not only known that they will be received, but also that they will be kindly and skillfully treated, and that the chances of recovery are greatly in their favor. None can doubt, then, that the same amount of care, watchfulness, and skillful treatment in a better adapted and less crowded building, and in a more favorable location as to climate and other sanitary influences, would largely augment the percentage of cures, and lessen the proportion of deaths.

Influenced by these considerations, the last Legislature passed an Act, approved March twenty-seventh, eighteen hundred and seventy-two, to provide further accommodation for the insane, and, in so doing, have made a movement in the right direction towards lightening the grievous incubus which, in manifold ways of sorrow and suffering, weighs heavily on all classes of our citizens. In this Act, which is most carefully drawn up, and hedged around with every barrier to its possible abuse, the Governor was authorized to appoint three Commissioners to select a site for a new asylum. For the express purpose of securing a suitable, mild, tonic climate, in the thickest settled part of the State, so as to lessen, as much as possible, the injurious effects of long transportation, the selection of the site was confined to the western portion of the State, embracing the central coast counties, and the counties bordering on or near the Bays of San Francisco, San Pablo, and Suisun, and lying west of the Valley of the Sacramento and San Joaquin Rivers. The Commissioners being authorized, upon the above named basis, to fix more definitely the limits to the territory to be admitted and considered in selection of said site. In the discharge of these duties the Commissioners, duly appointed by the Governor, recommended a two hundred-acre tract of land in Napa County, as will be seen in the subjoined report, which was filed in the office of the Governor, on the second of August, eighteen hundred and seventy-two. The law making the final selection of the site, subject to the approval of the Governor and the Secretary of the State Board of Health, the latter functionary, in obedience thereto, and at the instance of the Governor, proceeded to visit and examine the site. On the tenth of August, eighteen hundred and seventy-two, the Secretary of the State Board of Health filed his report, herewith subjoined, in the office of the Governor, approving of the site selected by the Commissioners, and which received the final assent of the Executive. According to the law, the Governor next appointed a Board of Directors, whose duty it was to adopt plans, and

proceed at once with the erection of the necessary buildings, for the accommodation of not exceeding five hundred patients, at any one time. The Act wisely provides that the plans, specifications, etc., shall, before final adoption, be submitted by the Directors to the Governor, to Dr. Shurtleff, Resident Physician of the Stockton Asylum, and to Dr. Wilkins, late Commissioner in Lunacy for this State, with whom it is made the duty of the Directors to consult and advise. That the Directors have thus far fulfilled all these requirements, the accompanying communication goes to show; and it is a source of no small degree of satisfaction, being ourselves a party implicated in this important measure, to be able to report progress. In the name of humanity, therefore, and for reasons above assigned, it is hoped, that no delay in the speedy completion of a portion, at least, of this much needed asylum, will result from the want of necessary pecuniary appropriations.

The following documents are herewith presented, in the order of their dates, together with explanatory specification and estimates of the accompanying plans, that have been adopted. All of which, it is trusted, will prove acceptable:

The Act of March twenty-seventh, eighteen hundred and seventy-two, providing for a new Insane Asylum, defines the duties and powers of the Commissioners as follows:

"SECTION 4. Said Commissioners shall qualify by taking an official oath within ten days after their appointment; and within fifteen days after their appointment, they shall meet and organize by selecting of their number a Chairman and Secretary; they shall have power to receive by gift or to contract for the purchase of such site for the location of said asylum, subject, however, to the approval of the Governor and Secretary of the State Board of Health, to whom they shall report their action in the premises, addressed to the Governor, within four months after their appointment; they shall keep a record of their proceedings; they shall receive for their services ten dollars per day and their traveling expenses; provided the entire compensation shall not exceed the sum of three hundred dollars for each Commissioner. Their bills shall be audited by the State Board of Examiners and paid out of the General Fund. When the site by them selected, and their official acts and contracts to secure the same to the State for the use aforesaid, shall be duly approved, as herein provided, their powers, duties, and compensation shall cease."

REPORT OF THE COMMISSIONERS.

To His Excellency NEWTON BOOTH,
Governor of California:

SIR: Having been appointed by your Excellency as Commissioners to select a site for a new asylum for the insane, and having discharged the duties assigned us, we herewith respectfully submit our report:

The following article, from the *Sacramento Union* of April nineteenth, will show the organization of the Board, the general principles by which it would be guided, and the notice given to all to whom it might concern.

[The article referred to, as already published, defined the duties and powers of the Commissioners, and will be found in the Appendix.]

Governed by these general principles, and actuated by a desire to find a location possessing all or as many of the foregoing advantages as possible, and especially one of easy access to the great City of San Francisco, from which at least one half or two thirds of the patients committed to this asylum must come, it was determined, by tacit consent if not by agreement, that no place should be selected beyond the reach of easy visitations from that city in one day. Sundry places located in the Counties of Marin, Sonoma, Napa, Contra Costa, Solano, Alameda, San Mateo, Santa Clara, and Santa Cruz, were visited by the Board, and the advantages of each duly considered.

Sites presenting some of the prescribed requisites were found in all of the localities visited. In most, fair locations could have been obtained, but only two sites were found promising all the advantages named, viz: salubrity of climate, equable temperature, convenience of access, nearness to railroad communication, vicinity of some town or city, beauty of scenery, freedom from mosquitoes, facilities for drainage, and an abundant supply of pure fresh water that can be brought to the top of any building. One of these sites, a map⁽¹⁾ of which is herewith submitted, has been unanimously selected by the Board.

It is situated one and a half mile southeast of Napa City, and contains two hundred and eight acres of land, of which about forty acres are bottom land, one hundred and sixty acres table land, and eight acres of mountain land. Most of the bottom land is well adapted to the growth of vegetables, hay, etc. The table land is said to be fine grain land, and well adapted to the production of the grape and other fruits; and as it rises at an elevation of eighty feet to the mile, it possesses a fine site for the buildings, and offers facilities for a perfect system of sewerage and drainage. A fine stone quarry of good building material is upon the eight acres mountain land, and adds materially to the value of the tract. The water supply is from a mountain brook of never failing source, on an adjoining tract belonging to Nathan Coombs, who has generously entered into bonds in the sum of twenty thousand dollars to convey to the State, for a nominal consideration, all the water privilege that may be required on the asylum grounds, for whatever purpose, now and forever, "reserving only the right to take from the water works or pipes, or either of them, any excess of water above and beside what is required for the asylum and grounds—the State, by its respective agents, alone to determine when there is any excess;" and at a distance of three fourths of a mile from the east line of the place selected, the water supply may be obtained at an elevation of two hundred feet. The tract is bounded on the west by the Napa Valley Railroad, about half a mile from the site where the buildings will probably be erected; and in full view of Napa City, and the site selected for the Odd Fellows' College, on the west side of the valley.

This land is the property of Don Cayetaño Juarez (one hundred and eighty-one acres) and J. H. Thompson (twenty-seven acres), who have given bonds in the sum of twenty thousand dollars each, all of which are herewith submitted, to convey the lands to the State for the sum of sixty dollars per acre, a reasonable price; in each case the money to be paid on or before the thirtieth day of January. It is to be regretted that no meteorological tables have been kept at Napa City, as the temperature of the valley varies at different localities. The upper portion, being shut off by a range of mountains from the breezes of the bay, is

(1) The printing of this map was deemed unnecessary.

warm in Summer, while that from Napa City to the bay has no such obstructions, and is, therefore, cool and pleasant; at least such is the unanimous testimony of those who are familiar with its seasons. As an evidence of the freedom of this locality from malarial influences, we are informed by Doctor Stillwagon, who has practiced medicine there for twenty years, that he has never been called upon to treat a single case of chills. Taking all things into consideration, it is confidently believed that no asylum in existence combines more advantages of location than pertains to this, and the Board is more than gratified at finding so admirable a site for the new asylum.

The other place alluded to, is situated one mile west of Redwood City, on the estate of Horace Hawes, deceased, and known as "Mount Eagle." It possesses all the advantages that pertain to that of Napa, and has some desirable features in addition. It is more accessible to San Francisco, from which city most patients must necessarily be sent. It can be reached in half the time, and but little more than half the cost of fare to Napa. There is upon the premises a natural mound for the erection of buildings, from which a splendid view of the bay is obtained, in addition to other charming scenery, all of which are most desirable. But this place is still in litigation, and no one has power to confer a title. Its selection, therefore, was of necessity abandoned. This place was valued at two hundred and fifty dollars per acre, a little more than four times the price of that selected by the Board. The same quantity of land included at Mount Eagle, as has been agreed upon at Napa, would have cost the State forty thousand dollars more, and may well be taken into consideration.

That region of country immediately in the rear of Oakland, Brooklyn, and Alameda, is beautiful in the extreme, perhaps unequaled by any in the State, and its climate unobjectionable, but an independent water supply could not be found, in connection with other desirable, if not necessary, requisites; and in all cases, the desirable places are held at prices that, in the opinion of the Board, were too high to be paid under the circumstances. A place of similar size (two hundred and eight acres), and possessing like advantages with those at Napa or Redwood City, would, if in the vicinity of Oakland, probably be held at seventy-five or one hundred thousand dollars, which, in addition to other considerations, in our judgment, was a sufficient reason for the selection made.

There are also many beautiful places on the peninsula, between San Francisco and San José, but, with the exception already noted, none possessed the advantages of the Napa tracts.

In the Pajaro Valley two sites were found, which, though equal in themselves to any visited, were considered too far from San Francisco, and from the railroad, for the purposes of the asylum. Indeed, we may add that the climate of Santa Cruz County and city is very desirable, and the scenery surpassingly beautiful.

In conclusion, we take pleasure in acknowledging our obligations and returning our thanks to the citizens of all the places visited for innumerable acts of kindness, courtesy, and hospitality; and if we have not been able to conclude that each place was superior to all others, it is nevertheless hoped that it will be conceded that we have been actuated solely by what we conceived to be the best interest of the State and of that class of suffering humanity who are to be the beneficiaries of the asylum.

C. H. SWIFT,
E. T. WILKINS,
G. A. SHURTLEFF.

REPORT OF THE SECRETARY OF STATE BOARD OF HEALTH ON THE SITE OF
A NEW INSANE ASYLUM.

OFFICE OF THE STATE BOARD OF HEALTH,

Sacramento, August 10th, 1872. }

His Excellency, NEWTON BOOTH:

DEAR SIR: I have the honor to inform you, that, in compliance with your expressed wishes, I visited, on the eighth instant, the site selected by the Commissioners for a new asylum for the insane. I passed a great part of the day in riding over and inspecting the grounds with a view to adaptability for the purpose contemplated. It affords me great satisfaction to be able not only to confirm all that has been so graphically described by the Commissioners as to topography, accessibility, and other essential requirements, but also to express my surprise and pleasure at the admirable surroundings and picturesque scenery appertaining to the locality in question. Rising gradually, as the land does, at the rate of eighty feet to the mile from the bottom land, where the Vallejo and Calistoga Railroad traverses, it affords, at about half a mile from this its western boundary, an excellent site for the erection of the buildings, embellished by a natural growth of a few oaks, and commanding a panoramic view of the circumjacent mountains and neighboring City of Napa, of exceeding beauty. This latter consideration is of no little importance, it being now the settled opinion of the most able alienists, that in order to ameliorate the condition of the insane and to effect the greatest possible number of recoveries, too much thoughtful attention cannot be given to the location of the buildings, so that every advantage may be derived from the views and adjacent scenery.

With all due deference to the economic ideas of the Commissioners, who have manifested too nice a sense of the extent of the pecuniary responsibility involved in the high trust confided to them, I must here express my regret that provision has been made for the purchase of only eight acres of the mountain land on the eastern line. In my judgment, a sufficient quantity of this portion of the tract should have been obtained to encompass the mountain brook, for which a water privilege is to be held, conformably with a bond to be entered into with Nathan Coombs, the proprietor. Pure, bright, and sparkling as this water now is, the least animal refuse or organic matter may poison it at its source, and convert it from an Hygeian fount into a Stygian stream. Apart from the importance, therefore, of securing this land, while it can be purchased at a reduced price, as I have been assured by Mr. Coombs, it must be remembered that, as has been justly laid down by the State Commissioner in Lunacy, in his exhaustive report, "at least half an acre of land for each patient to be accommodated, not only for farming and gardening purposes, but for pleasure and exercise grounds as well, should be provided." Now if the projected buildings are to be constructed for the accommodation of five hundred patients, two hundred and eight acres would not afford the requisite proportion of ground, as above specified. Without wishing to throw any impediments in the way of the immediate consummation of the project for a much needed Branch Asylum, but merely offering these remarks, Sir, as suggestive before making your final decision, I proceed to state that not only as regards topographic, but also climatic fitness and salubrity, do I find the site most judiciously selected. In the absence of any continuous series of instrumental proofs of the tempera-

ture and other meteorological phenomena of a reliable nature, I have satisfied myself, from some fragmentary observations of others, as well as of mine own, that no more equable nor more salubrious climate can be found in any other part of the State north of Santa Barbara, so far as my present knowledge extends. On the day I passed at Napa, the thermometer and course and force of the winds were carefully noted by me, and I find that the reading of the former was ten degrees less at Napa City at two P. M., in the Revere House, where I then was, than it was here at the same hour of the same day in the Central Pacific Railroad Company's office. During the late "heated term," which was felt more or less everywhere, the comparative maximum temperature of Sacramento and Napa City stands as follows:

Maximum temperature.

1872.	Sacramento.	Napa City.	Difference.
August 1st.....	96°	80°	16°
August 2d.....	98°	76°	19°
August 3d.....	99°	75°	34°
August 4th.....	94°	75°	19°
Mean	96.7°	77.2°	19.5°

It will be seen that there was a difference of nearly twenty degrees between the mean maximum temperature here and at Napa City. These observations for the latter place were registered at the Revere House, and are verified by the most respectable citizens.

From some thermometrical observations made for four consecutive months, during the Summer of eighteen hundred and fifty-six, by James M. Thompson, of Suscol, I am enabled to construct another table for the purpose of comparing the mean Summer temperature of Napa City with that of San Francisco and Sacramento.

Mean temperature.

1856.	May.	June.	July.	August.	Mean.
Sacramento.....	63°	72°	76°	76°	71.7°
Napa City.....	59°	63°	60°	63°	61.2°
San Francisco.....	58°	62°	59°	59°	59.5°

The influence of the trade winds upon the Summer temperature of these three points, is here plainly demonstrated. At San Francisco there is no obstacle presented to the force of the chilling oceanic winds, which rush directly through the Golden Gate, with increased momentum, as through a funnel; whereas, at Napa City, such is the conforma-

tion of the valley, these winds are broken in violence by the opposing mountain barriers. At Sacramento, distance still further modifies the same winds, which, having a common origin, are deflected in their course by the Contra Costa Mountains, and reach us, with much diminished force, as south-southeast winds.

Were it not for the peculiar arrangement of the mountains, Napa City would suffer as severely from the oceanic winds as Vallejo and Benicia. As it is, the climate at Napa City affords such a tempered medium between our interior heat, and the chilling winds of the coast region, as would allow the majority of all the inmates of the asylum, under proper regulations, to take out-of-door exercise, for at least a couple of hours, morning and afternoon, for all seasons, and in warm weather, when suitable shade trees, arbors, walks, and seats are provided, they may beneficially spend one half of their time in the open air.

With regard to the salubrity of the climate and location—a most important alleviative, or rather curative agency—I would remark that the testimony of all the resident physicians of Napa City, is to the effect of the absolute freedom of the surrounding country from malarial disease. Dr. M. B. Pond, who has written most explicitly on this point, states: “I have resided here six years, engaged in the practice of medicine, and must state that I have not known an epidemic, or even a marked endemic disease, to originate here during that period. There is no disease that regularly, or even frequently, returns at stated periods of the year. Typhoid fevers are scarcely known here; intermittent not at all, except when imported from abroad. Remittent fevers are more frequently met with, but they only occur as sporadic cases, and not at regularly recurring seasons. * * * During the Summer the thermometer ranges from sixty degrees to seventy-two degrees, with only occasional exceptions, and those lasting only two or three days at a time.”

Dr. Stillwagon, who has practiced medicine in Napa City for the last twenty years, not only corroborates all that has just been quoted, but affirms that after a careful examination, in his legislative capacity, with Dr. Shurtleff, of the records of the asylum at Stockton, fewer cases of insanity were found sent from Napa City, in proportion to the population, than from any other point in the State. It would seem, therefore, from *a priori* reasoning, that the best place for treating the disease is where the causes exist in the least intensity.

The whole subject, you will perceive, Sir, involves questions of the deepest interest and of the most intricate nature, and should be thoroughly grappled with both by the State and its medical men, if we wish to keep down the number of the insane as small as possible by healing all that can be healed in the curable stage of their disorder.

Regretting that the very limited time of only four days allowed me, after the filing of the report of the Commissioners, according to the terms of the Act, necessitates so hurried a summary of the facts which I have been able to possess myself of, bearing on this momentous State charity, and the consequently hasty conclusions I have deduced therefrom, I remain, very respectfully, your obedient servant,

THOMAS M. LOGAN,
Secretary State Board of Health.

REPORT OF THE BOARD OF DIRECTORS OF THE NAPA STATE INSANE ASYLUM.

To the State Board of Health:

GENTLEMEN: Through the politeness of your Secretary, Dr. Logan, the undersigned have been invited to accompany the adopted design of the new State Insane Asylum with such a report upon the subject of their appointment as may be of service to the Governor and legislators during the next session of the legislative bodies.

On the thirteenth of September, eighteen hundred and seventy-two, Messrs. J. H. Jewett, of Marysville, and James H. Goodman, Chancellor Hartson, and R. H. Stirling, of Napa City, met at the rooms of the "Napa State Asylum for the Insane," in Napa City, and organized as the regular qualified Board of Directors of said asylum. Dr. J. F. Morse was elected as President, James H. Goodman as Vice President, and W. C. Watson as Treasurer and ex officio Secretary. On the nineteenth of October ensuing, Dr. Morse presented his credentials and joined the others in their duties to the State.

At this meeting it was determined to advertise for plans and specifications for an asylum building, and to offer, as a premium to competing architects, one thousand five hundred dollars for the best design, one thousand dollars for the next best, and five hundred dollars for the third in comparative merit. It was also resolved to limit the maximum expenditure of said asylum building to six hundred thousand dollars, and to require accommodation for five hundred patients, which should be as complete as present experience in asylum architecture could make it.

On the sixteenth of January, eighteen hundred and seventy-three, elaborate plans were submitted by the following architects, to wit: J. W. Bones, Bugbee & Son, A. F. Eisen, Wright & Sanders, J. Gosling, Coulette & Johnson, and John J. Newsom. It was ordered that Governor Booth, and Drs. Wilkins, of Marysville, and Shurtleff, of Stockton, should be invited to meet the Board on the twenty-third of January, one week hence, and assist in the selection of plan. At this date these gentlemen met the full Board at Napa City and carefully inspected the plans submitted. A conditional preference was expressed for the design of Wright & Sanders, and an adjournment taken for final meeting at the call of the President.

Pursuant to notice, the Board met at San Francisco on the eleventh day of February ensuing, when the premiums were distributed as follows, to wit: Premium first to Wright & Sanders, premium second to Bugbee & Son, and premium third to A. F. Eisen. The plan of Wright & Sanders was then officially adopted and those gentlemen selected as architects, in accordance with the requirements of the law.

Advertisements soon followed for lime, cement, and bricks, which resulted in the acceptance of the bids of the Pacific Cement Company for cement, of Cox & Colby for plain and pressed bricks, and H. K. Knapp for lime.

After duly advertising for estimates on the foundation, the contract was made with J. Cochran, proper bonds secured, and the work immediately commenced.

The Directors report that, while determined to carry out and be governed by the direction and meaning of the statute under which they are appointed, yet, in the contract for building the foundation, the demonstrable difference in expenditure of time, money, and convenience was

so much in favor of a contract for the whole foundation, that they determined to allow this much of the work to be done at once. This they did not do, however, until consultation with many architects and builders as to the question of economy to the State.

An excellent foundation will soon be completed, prior to which we shall advertise for estimates upon the whole superstructure, but in such a manner as to enable us to comply with the law in respect to finishing a portion of the building for the earliest possible occupation.

We regret that the provisions thus far made by the State for the construction of this asylum are so limited as to make it impossible to utilize many accessible sources of economy, and quite impossible to meet promptly the increasing demand for its early completion.

From the able report of Dr. E. T. Wilkins, Commissioner in Lunacy for the State of California, every legislator can learn how important it is that this whole building should be finished and occupied. At the present time the number of patients in excess of accommodation at Stockton is far beyond those recognized requirements which universal experience has enacted. Indeed, the present surplus would be sufficient to nearly, if not entirely, fill the institution now in process of erection at Napa, were the same ready for subjects. In order to make this apparent at a glance, let us call attention to the following brief quotation of this Commissioner's report of eighteen hundred and seventy-two :

"But there is another question that must not be overlooked in our solicitude for the establishment of a new asylum, and which is a matter of equal concern. It is the present crowded condition of the asylum at Stockton. With accommodations for not more than six or seven hundred patients, there are packed in its wards about eleven hundred, or four hundred more than it can properly accommodate. Dr. Shurtleff tells us in his report, 'That besides two patients in the rooms intended for but one, in eight out of the eleven wards, two hundred and twenty-seven patients are sleeping on beds nightly prepared for them in the halls.' Two of these wards, the second and tenth, intended for thirty patients each, now have about eighty each. These wards are poorly ventilated, low and uncomfortable in the extreme, and should be erased from the face of the earth and the memory of man. They never were fit receptacles for any human being, and have been tolerated altogether too long.

"To the crowded condition of these wards, and the hospital generally, must be attributed the increased mortality of the last four years. And should it be our misfortune, which God forbid, to be visited with cholera, or other epidemic, there is no place to which the patients could possibly be removed, and they would consequently be swept away like sheep with the rot. Let any member of the Legislature visit these wards at bedtime, and if he does not conclude that it is a sin and a shame not to do something for their immediate relief, we will be willing to acknowledge that we ourself have lost our reason and our head, and a fit subject for the very wards we have described, or that he himself is in such a condition, for no two sane men could ever agree to the policy of doing nothing after having visited them."

We have made this brief quotation in order to demonstrate that urgent demand for more asylum accommodations which induced the last Legislature to order the erection of a new asylum at Napa, and at

the same time to call the attention of the authorities to the insufficiency of the provision thus far made for this new asylum building. The law provides for raising one hundred and seventy-five thousand dollars annually, for two years. Of this, two fifths are to go to the Stockton institution until the latter place has received one hundred and thirteen thousand dollars. This reduces the total provision for the Napa asylum to two hundred and thirty-seven thousand dollars, and this sum, depending as it does upon the annual tax collections, is so uncertain in its accessibility that much, both of expedition and economy, must be sacrificed in its outlay.

The same policy which the individual adopts in the erection of a large building, is the best policy for community or State. Only where the provision is complete and accessible can economy in time, material, and competition, be utilized. As a matter of interest, of policy alone, this is a rule universal and almost unfailing throughout human experience. But here it cannot be claimed that policy is the chief consideration. It is none the less binding, none the less supported by the laws of common sense, but in the erection of this new asylum we are urged by an appeal of humanity which civilization makes paramount, and which duty enjoins as the highest privilege of the individual, and the greatest ornament of State. To take good care of those who are disfranchised of reason, to do all that can be done to restore consciousness, and judgment and responsibility to those who have lost them, is an office so high and so reasonable that, in the United States at least, the response is generally prompt and munificent. Thus, in the State of New York, are—

Name.	Cost.
The New York State Lunatic Asylum at Utica, at a cost of.....	\$661,065 58
The Willard Asylum for the Insane at Ovid.....	728,727 11
The Hudson River State Hospital for the Insane at Poughkeepsie.....	1,200,000 00
The Buffalo State Asylum for the Insane at Buffalo.....	800,000 00
The New York State Homœopathic Asylum for the Insane at Middleton.....	360,000 00
Total	\$3,749,792 69

In no State of the Union is the necessity for increased asylum accommodations so urgent as in California. And as nothing can relieve this necessity but the most expeditious construction of a building, and, as the humanity of the State has already commenced such a work through the undersigned Board of Directors, we would violate our duty if we did not beg the existing and incoming authorities to so modify their system of providing means for the Napa State Asylum, as will secure its most expeditious and economical construction.

JOHN. F. MORSE,
J. H. JEWETT,
JAMES H. GOODMAN,
CHANCELLOR HARTSON,
R. H. STIRLING,

Board of Directors of Napa State Asylum for the Insane.

SAN FRANCISCO, August 20th, 1873.

REPORT OF THE ARCHITECTS OF THE NAPA STATE INSANE ASYLUM.

To the Honorable Commissioners for the erection of the Branch Insane Asylum, at Napa:

GENTLEMEN: In compliance with your advertisement for plans and specifications for the erection of the Branch Insane Asylum, we beg to submit the accompanying designs for your favorable consideration, comprised in the following drawings, viz:

First—Ground or first floor plan.⁽¹⁾

Second—Second floor plan.

Third—Third floor plan.

Fourth—Fourth floor plan.

Fifth—Perspective view from the southwest.

Sixth—Isometrical view from the southwest.

In preparing our designs we have endeavored to keep in view the following essential requisites, named in the order of their importance. These are:

First—Appropriate and pleasing design.

Second—Solidity and security of construction.

Third—Economy of expenditures, and facility for supervision and management.

Fourth—The principles laid down for the construction of hospitals, unanimously adopted at the Convention of Medical Superintendents of American Institutions for the Insane, in eighteen hundred and seventy-one, have been fully carried out in the plans which we have submitted.

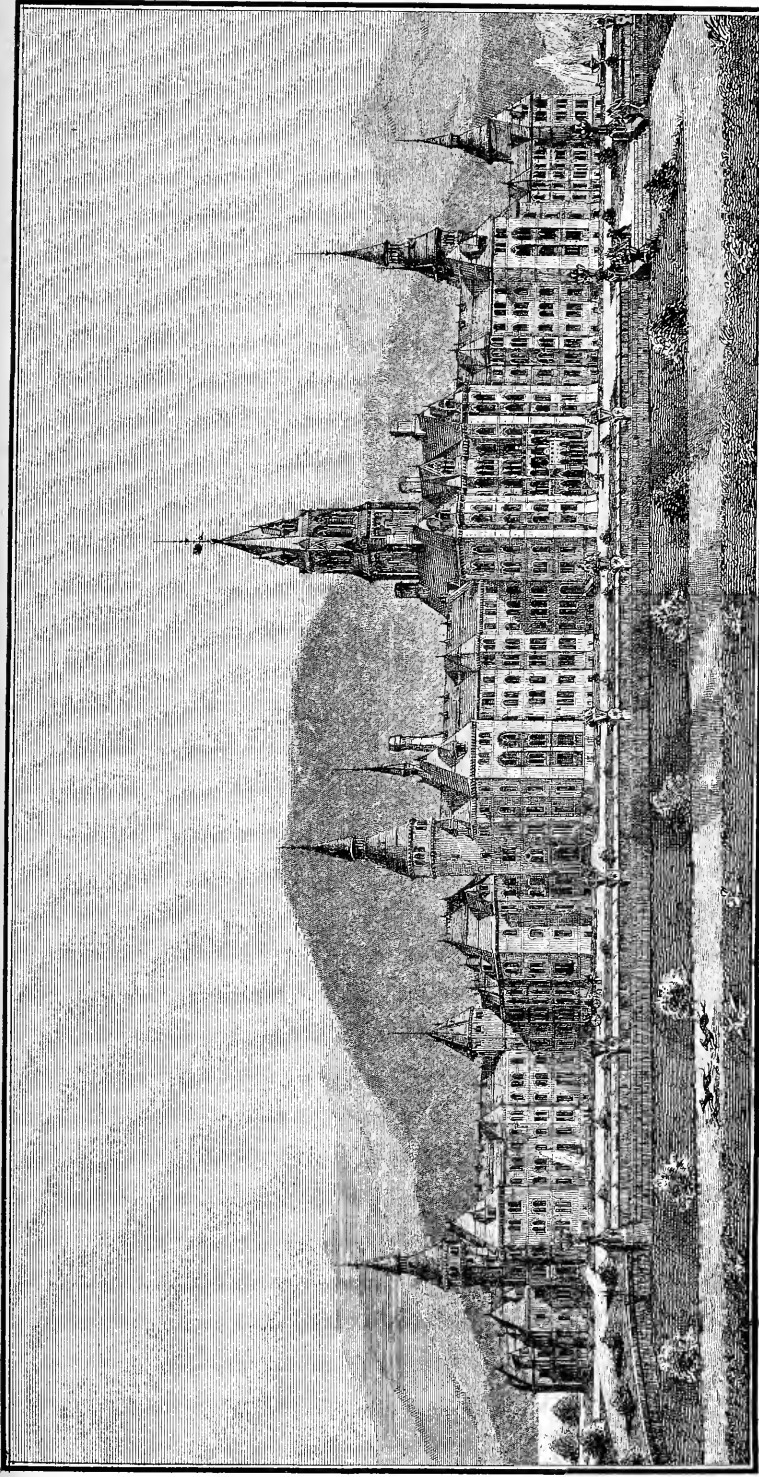
Style of architecture.

The new asylum is intended to face the west, and consists of a center building with wings extending on each side, and are exactly alike—the divisions for the sexes being equal; twelve wards on each side, exclusive of the infirmaries, and one ward on the fourth floor of the center building, and has accommodations for five hundred patients. The style of architecture is domestic gothic, being the least expensive, and best adapted to the site; and with its several projections and towers, and the hills and trees in the background, will give a very attractive and pleasing effect to the whole.

Number of patients and wards on each floor.

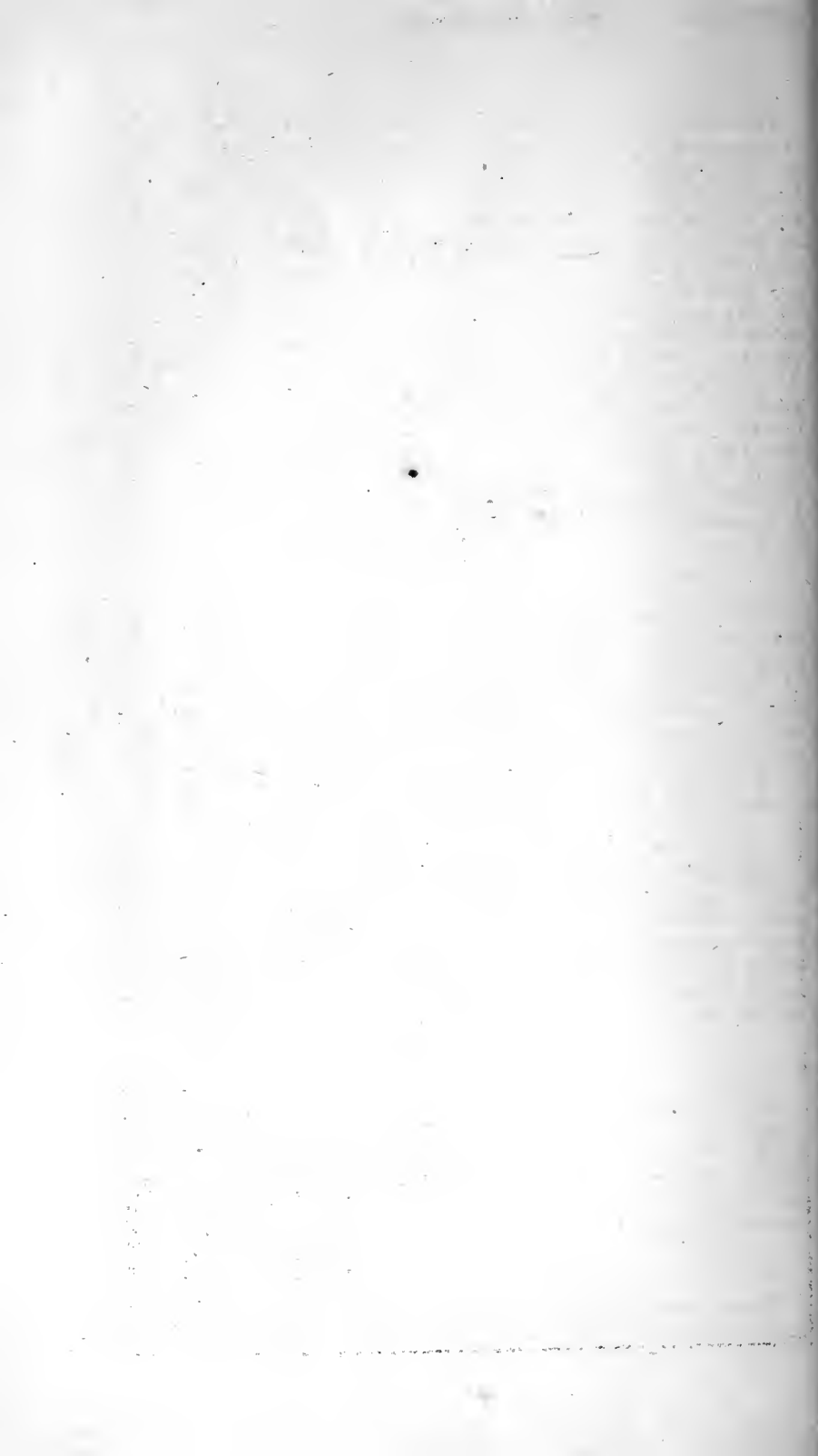
	Males.	Females.	Total.
First floor, four wards	74	74	
Second floor, four wards	74	74	
Third floor, three wards	60	60	
Fourth floor, one ward	20	20	
Fourth floor, center building, one ward	44	.....
	272	228	500

(1) The second, third, and fourth floor plans, were not deemed of sufficient importance in this connection, to be engraved.—[Secretary of State Board of Health.]



Perspective View of the
STATE ASYLUM
for the Insane at
NAPA.

J. H. Johnson & Co.



Construction.

The outside walls of the basement story are to be built of stone from the quarries adjoining the asylum property. The walls above can be built of rubble, stone, or brick, and if the latter is used, the walls will be sixteen inches thick, laid hollow, with an air space of four inches; the interior walls on the corridors will be sixteen inches, to leave room for the ventilating and heating flues; the division walls between the single rooms will be nine inches thick. The roof to be framed in wood and prepared for slate or medallion metal. The plastering will be done directly upon the brick walls, and the floors will be deafened with spent ashes and mortar, which renders the building as nearly fire-proof as possible, without going to the expense of iron joists and brick arches. The circular towers at the intersection of the wards, are to be built upon a system of fire-proof construction, with stone staircases and well-holes built up solid. The floor to be on the Dennett arch principle, and paved with artificial stone. The doorways connecting with the wards on the different stories, are all to have stone sills with iron doors, in addition to the ordinary wooden ones. The upper stories of the towers are intended for the water tanks.

Basement.

This story, which will be about five feet above the ground, contains the hot water boilers for supplying the wards, the tramway, which extends through the basement of every ward—and also to the basement of the laundry—dumb-waiters from the kitchen and laundry, with the other dumb-waiters for supplying the dining rooms on the different floors, the clothes and dust shafts, also the hot air chambers for heating the building, and a number of storerooms under the kitchen wing. This story is well lighted and ventilated by means of windows above the ground floor level.

First floor.

The main center building is divided by the center hall into two equal parts; that to the left contains the Apothecary's shop, Superintendent and Secretary's offices, with private staircase communicating with the Superintendent's apartments above, and in the rear the steward's office and men's reception room, while that to the right contains the public parlor, library, and officers' dining room, and immediately behind these the matron's room and ladies' reception room.

Second floor.

This floor is reached by the main center staircase, and is appropriated exclusively to the use of the Medical Superintendent's family; it contains a parlor, sitting room, library, dining room, and three bedrooms, water closet, bath room, dumb-waiter, and three clothes closets, and in the rear four large spare rooms, and also a private entrance and staircase from the ground floor.

Third floor.

This floor is reached by the main staircase from the second floor; the front contains the chambers for the use of the assistant physicians,

matron, and steward, two bath rooms, lavatory, two water closets, and three clothes closets; and in the rear, two large spare rooms, bath room, lavatory, and water closet.

Fourth floor.

This floor is reached by the main staircase from the third floor; and is arranged with associated dormitories for the accommodation of forty-four patients, with dining room, dumb waiter, pantry, lavatory, water closet, bath room, and clothes room.

Rear Building—First floor.

Immediately behind the center building, on the south side, are the lavatories and water closets for the females; and on the north side, the same for the males; and still further in the rear, are the trunk room, clothes room, servants' dining room, kitchen, storeroom, pantry, tin room, steward's office, and general store, with staircase to the basement.

Second floor.

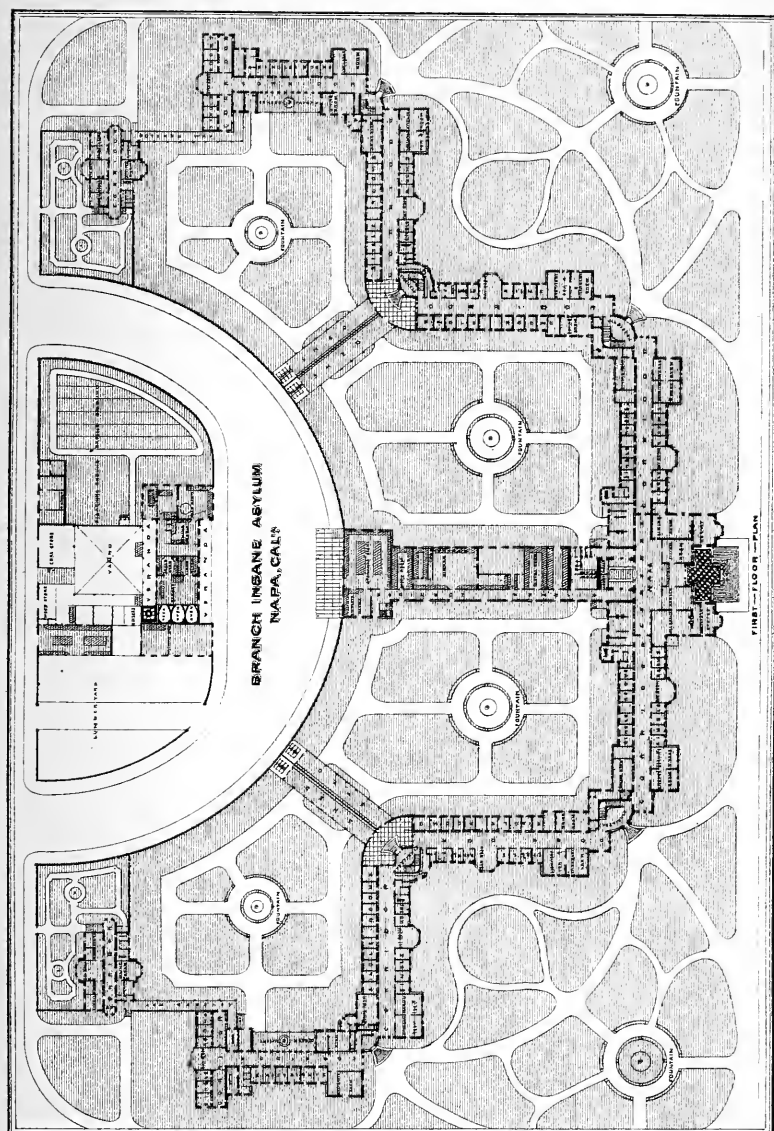
This floor is reached by the staircase in the rear corridor, and is divided off into chambers for the servants connected with the kitchen department, with lavatory, bath room, and water closet. The chapel is on this floor, directly over the trunk and clothes room, and is reached by the main staircase from the central hall, with two doorways, one on the south side for the females, and one on the north side for the males, with lavatories and water closets for each sex. The gallery is across the west end, and has two entrance doors from landing of main staircase, same as on the main floor.

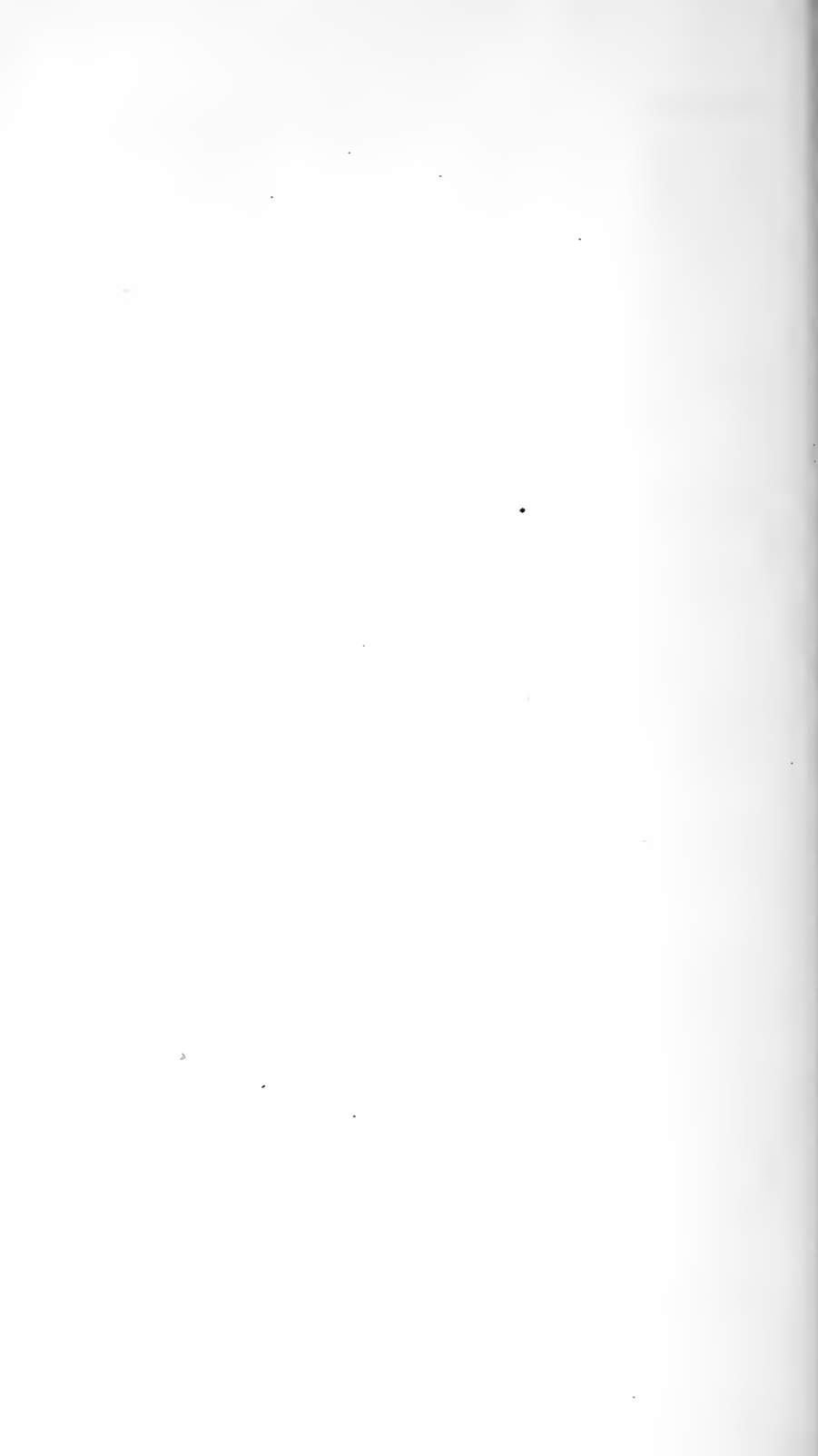
Arrangement of wards.

Each ward has connected with it a day room, a corridor, single lodging rooms for patients, an associated dormitory communicating with a chamber for two attendants, a clothes room, a bath room, a water closet, a lavatory, soiled clothes shaft, closet for brushes and buckets, a drying closet, a dust flue, and two fire-proof staircases to each, so that the patients will be able to reach the inclosed yards in the rear; or the pleasure grounds in front, without communicating with the other wards. Every room in the building has a flue communicating with the fresh air, duct for warm or cold air, with ventilating flues terminating in the various ventilators in the roof of the building. The water closet, lavatory, and bath room, open from a small passage, and not from the main corridor, and the bath room and lavatory have a communicating door, in order that the latter may serve on bathing days as dressing room to the former.

The wards for excited patients are to have on one side of the corridor a conservatory for flowering plants, birds, etc., and a water fountain in the center of each.

Laundry, bakery, and engine house, are placed in a detached structure, one hundred feet to the rear of the hospital buildings, and contains on the first floor the engine room, workshop, bakery, bread room, storeroom, foul linen room, mending room, laundry, with staircase to the drying and ironing room on the second floor.





The second story of this building is reached by the staircase in the center hall, and is divided into chambers for the use of the servants connected with this department, with bath room, water closet, and lavatory, and in the rear are the sheds for coal and wood; large court and drying ground for the laundry on the female side, and carpenter's shop and lumber yard on the male side, and to the east, the dead house for male and female, with post-mortem room in center, supplied with hot and cold water.

Infirmaries.

In detached buildings, in the rear of the last wings, but connected by means of covered corridors, infirmaries are provided for each sex, fitted up with every convenience, having—besides the corridor, with large bay windows at each end, and chambers for the patients and attendants—a parlor, a dining room, a kitchen, a dumb waiter, a closet, a bath room, a lavatory, a water closet, a drying closet, a clothes room, a dust flue, and a water closet off the garden.

It must not be overlooked, that neither in the main building nor the infirmary is there a single dark room or borrowed light, but every room, water closet, and lavatory, has a window in each, communicating directly with the external atmosphere.

Lighting.

It is proposed to light the building with gas, on account of its convenience, cleanliness, safety, and economy, and to be manufactured from gasoline, without the use of fire—the works to be placed in a brick building adjoining the dead house.

Water supply.

It is proposed to have water tanks placed on the upper stories of the towers, capable of holding at least twenty thousand gallons of water, and to be so arranged that one or all may be used at pleasure. The tank for supplying the steam boilers are placed in the main central tower, and is elevated sufficiently to supply the boilers when carrying a pressure of forty-two pounds to the square inch. The boilers are also to be supplied with hot water from the condensed steam used in heating, which returns to a cistern, and forced into them by a small steam pump. An additional supply is also brought direct from the main.

The center building is to be supplied with hot water from the kitchen boiler, heated from a water-back behind the range. The boilers for supplying the wards with hot water are placed in the basement directly under the baths in each ward, and are heated from steam coils coming from the Summer pipe.

Hydrants are to be placed on the landings of each staircase throughout the building, and supplied direct from the main, with hose constantly attached, to be used in case of fire.

Heating and ventilation.

The boilers for heating the building are placed in the detached building in the rear of the hospital, and are also used for driving the ma-

chinery, cooking, washing, and heating the hot water boilers in basement for supplying the baths in the different wards.

It is also proposed to have in the basement story hot air chambers, built in brick, to receive the steam chests, which are supplied with steam from the boilers, with direct flues leading from them to the wards above. And the whole are so arranged, that one or all of these appliances may be used at pleasure.

To secure thorough ventilation, it is proposed to place above the collar ties a horizontal galvanized iron tube, to receive the vitiated air through separate vertical flues from the different wards below, terminating in the towers and ventilation turrets.

Downward currents of air for the ventilation of the water closets, urinals, bath-tubs, and sinks, will be secured through an arrangement of pipes terminating in the fire boxes of the boilers.

Provisions against fire.

The towers at the intersection of the outer and inner angles of the building are to be of fire-proof construction—stone being used for stairs and landings, and the floors of the Dennett arch, paved with artificial stone, and are built one story higher than the connecting wings, for the purpose of disconnecting the roofs, thereby preventing the spread of fire, should such a catastrophe ever occur. The division walls between the center building and the wings are built three feet above the roof, to serve the purpose of fire walls, and the door openings on every floor are to have stone sills, and iron doors in addition to the ordinary wooden ones.

Hydrants are to be placed both outside, in the grounds, and inside, on the landings of each staircase, with fire hose constantly attached, and supplied directly from the main, also from the water tanks in the towers; a sufficient quantity of hose is to be kept in the engine-room that will reach to any part of the front building, to be attached when required to the steam pump. This supply of hydrants, with an organized fire company of servants and attendants, and an unlimited supply of water, renders the building quite exempt from danger of destruction by fire.

Yards.

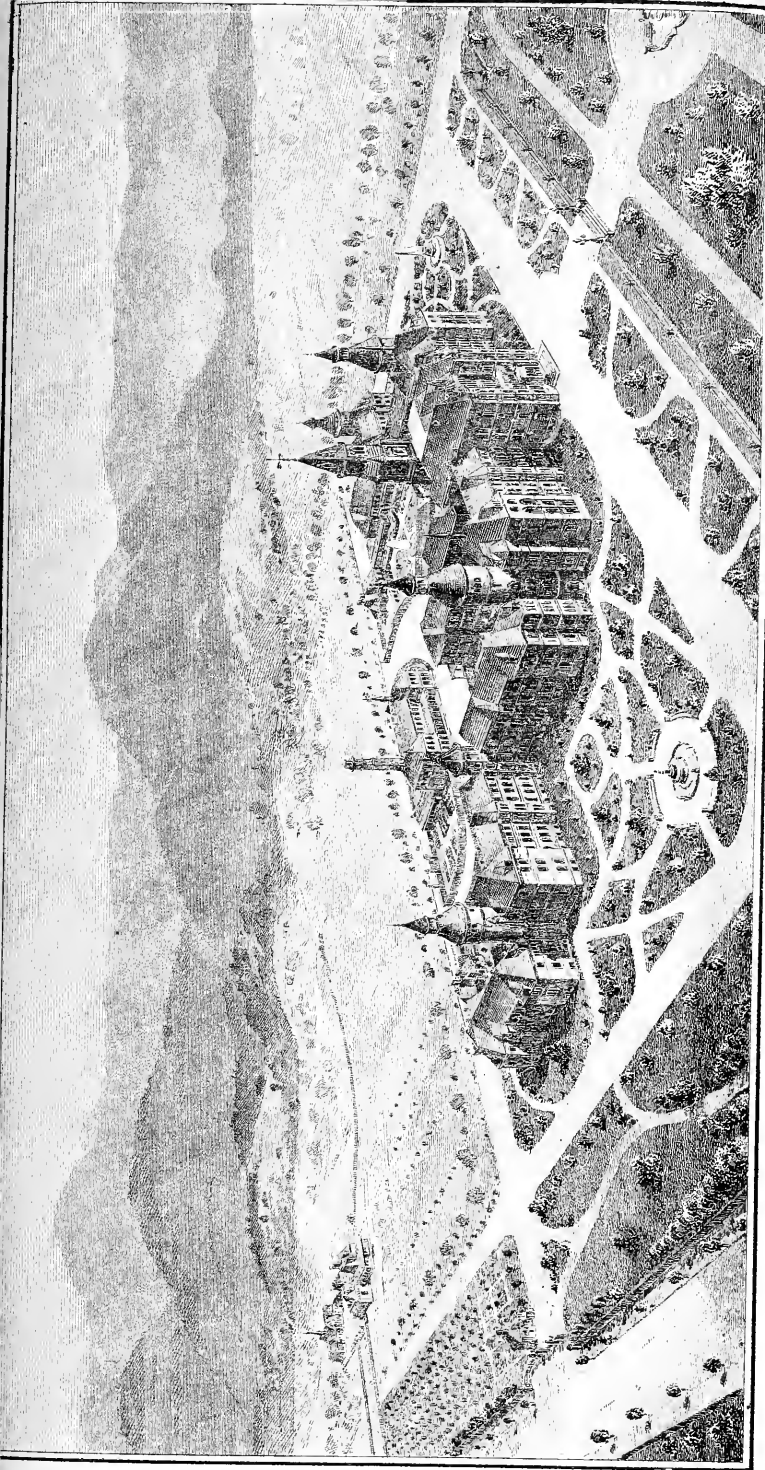
In the rear of the building there are three private yards on each side connected directly with the adjacent wards, for the use of the patients, with large airing sheds, and water fountain in the center of each.

Estimate.

The architects furnishing competitive designs for the Branch Insane Asylum to be erected at Napa, though not restricted or fettered in the adoption of style, outlines of plan, or location of buildings on the ground, are required to furnish accommodations for five hundred patients, and that the plans, etc., must be such as will afford a complete building for the sum of six hundred thousand dollars. This difficult problem we have sought to solve, and the edifice we have designed can be erected for that sum.

All of which is respectfully submitted by your humble servants,

WRIGHT & SANDERS.



Isometric View of the
STATE ASYLUM
For the Insane
NAPA.

As germane to the subjects discussed above, the following reports, which were read and approved by the State Board of Health—the first, on the seventeenth of January, eighteen hundred and seventy-three, and the second, on the eleventh of July, eighteen hundred and seventy-three, are here inserted.

The paper on “Insanity and its Relations with Jurisprudence,” was drawn forth from the author, at the solicitation of your Secretary, on the occasion of the important legal questions involved in the trial of Mrs. Fair, in San Francisco.

REPORT ON INSANITY AND ITS RELATIONS WITH JURISPRUDENCE, BY DR. E.
A. KUNKLER, OF PLACERVILLE.

As medicine is not, like mathematics, built on self-evident truth, but a science founded on experience, and on the observation of processes, sometimes of the most intricate character, it is to be expected that physicians, whose education has not been uniform, and whose mental powers and personal experiences are not the same, will often disagree. Hence, the question has been propounded: when doctors disagree as experts in a trial, involving the question of insanity, who shall determine the truth? Of course, the Judge, jurymen, and lawyers, however, being destitute of the knowledge of the nature, the causes, and the workings of the mental affections will, if not enlightened by medical men, in cases in which life and death are at stake, commit grievous mistakes.

On ideas founded upon scientific fact, sanctioned by observation and experience, or on the logical consequences of such facts, there can be no difference of opinion among physicians. But many doctors seek, in mental affections, their inspirations in books written many years ago; or in works still interlarded with the ideal creations of former times, not up to the standard of the present scientific knowledge. This fact is well illustrated by the discussion on moral insanity, in the Medico-Psychological Society, in Paris (American Journal of Medical Sciences, January, eighteen hundred and sixty-nine), and also in the medical testimony given in Mrs. Fair's case. It will, therefore, not be amiss to publish a short general sketch of the main known scientific facts bearing on insanity and its relations with jurisprudence, in terms easily to be understood by everybody, in order to diffuse a more correct knowledge on this important subject.

It has been ascertained, by microscopical investigation, that the white matter of the brain is composed of millions of nerve-fibres; the gray matter of an immense number of nerve-cells, or minute bags, of different forms and sizes, containing a fat-like granular matter; and that most cells are connected with one or with more nerve-fibres. It has also been observed that the nerve-fibres are minute tubes, containing a semi-fluid substance, surrounded by fatty matter; and from this construction, it is held by physiologists, that the office of the nerve-fibres is to carry, by vibration, the shock of different impressions to different cells.

By observation, it has likewise been ascertained that the brain, especially the gray matter, is supplied with blood-vessels, subserving for its nutrition and functional action.

Groups, or agglomerations of nerve-cells, have been called ganglia; and, by experiment, it has been found that the ganglia are the receptacles in which internal and external impressions are received and stored up. Therefore, the ganglia at the base of the brain, connected

with the nerves of the organs of the senses, have been denominated the optic, olfactive, auditory, and gustatory ganglia; and are considered to be the organs in which all the external impressions, transmitted by the organs of sense, are received and preserved, like photographic images.

Recent investigations have established that the convolutions of the external or cortical part of the brain, contain very minute, fan-like mechanisms, composed of nerve-fibres and nerve cells; and inasmuch as the convolutions are isolated from the ganglia of the organs of sense,—receiving only the fibres which radiate from the central ganglia, called the thalami, to the periphery of the brain; whilst other fibres converge from the convolutions to a mass of cells denominated the striated bodies, where fibres are in relation with the roots of the nerves ruling over the organs of motion: it has been concluded, from this peculiar arrangement, by scientists, that intellection is performed in the convolutions, where the impressions stored up in the ganglia are elaborated, and that the intellectual result is carried, by the powers of the will, through the fibres of the striated bodies, to the organs of motion. Pathological observations and post-mortem examinations have established that the acuteness of sensation, and the activity and irritability of the nerves, depend on the quantity of oxygen, carried by the arterial blood to the nerves, or the nerve-centers therewith connected; and that any sufficient excess, or deficiency of arterial blood, received by the brain or nerve-centres, by any cause, will derange the nutrition and the functional action of the brain matter, and bring forth, either an irregular action of the organs of motion, or abnormal mental manifestations; the phenomena changing, according to the degree of the perverted nutrition, and to the particular parts of the brain involved in the morbid process.

Microscopic inquiry has also demonstrated that any stimulus, irritation, or shock—physical or moral—directed upon a nerve, will contract the muscular fibers of the coats of the blood vessels supplied by that nerve, in such a manner as to diminish its calibre, producing an accumulation of arterial blood, or what is called inflammation, in the neighboring tissues, of a more or less great importance, according to the degree, and the continuance of the irritation. If such inflammations are the result of a mental or emotional shock, which is fugitive—lasting only a short time—they will soon scatter, and the effect is only temporary. But, if this inflammation is the effect of physical cause, more or less permanent, it will continue until its cause has been removed, either naturally or artificially, and lead to different structural changes.

Microscopical experiments have likewise shown that both narcotics and tonics act by stimulating the nerve-centers. Sleeplessness, often connected with cerebral affections, is in most cases the effect of the sympathetic irritation of the brain, by irritating substances present either in the liver or in the gastro-intestinal canal; experience having demonstrated that as soon as the emission of the bile is increased, and the bowels are freely moved, the sleep speedily returns.

More or less loss of consciousness, also met with in some mental affections, is sometimes the result of pressure on the brain; at other times, of venous blood circulating in the arteries.

It was formerly believed, and is still asserted in some works on insanity, that the chief causes of mental alienation were powerful mental or moral influences. But more careful investigations have established that moral influences alone will either arouse passion, such as anger,

grief, despair, or a temporary agitation of the mind, and that a very severe mental shock, such as by very sudden good or bad news, may even cause instant death by apoplexy, or otherwise; but that such mental shocks alone are incapable of producing a disease of the mind. Hence it is now generally admitted that there can be no insanity without the existence of some organic disorders, although such disorders are sometimes obscure.

The main physical causes of insanity are:

First—Plethora, or excess of red blood-corpuscles in the circulation, by which all the organs become gorged with blood, disturbing their functional action.

Second—Anemia, or paucity of blood, impairing the general nutrition.

Third—Affections or disorders of the stomach, bowels, liver, urinary passages, or worms, will react, by sympathetic action, upon the brain.

Fourth—Diseases of the heart, some of which will cause an excess, others a deficiency of blood to be carried to the brain.

Fifth—Injuries to the head, tubercles, diseased bones of the skull, and blood containing heterogeneous substances, will irritate, directly, the brain.

Sixth—Diseases of the lungs and its passages might excite cerebral irritation, by preventing the purification of the blood.

Seventh—Diseases or disorders of the organs of generation of women, and the different displacements of the uterus, will react sympathetically on the nerve-centers.

The congenital imperfect construction of some organs essential to life, transmitted from parents to children, when both parents possess the same imperfections, such as a large head on a short neck, admitting too easily an excess of blood into the brain, or a heart, lungs, liver, or kidneys of a capacity not in proportion with the size of the body, are the most prolific causes of hereditary insanity; apt to generate in the offspring the same diseases of the parents, if exposed to the same unfavorable influences. Syphilis being contracted by a specific animal poison, is evidently transmitted to children through the contamination or the poisoning of the blood. In insanity, however, there is no such taint, and it is therefore manifest that it becomes hereditary only in the manner related.

Self-abuse and drunkenness being only temporary effects of cerebral irritation, cannot by themselves set up mental affections, though they may excite temporary attacks of insanity, when there is already nervous irritability, by some other permanent organic disorder.

Besides these more or less evident causes of mental alienation, obscure cases are met with, connected, for example, with internal tumors, tubercles, morbid growths, or diseased bones, the existence of which cannot be ascertained during life; acting in combination with a disordered state of the portal circulation sometimes equally obscure. Experience, in effect, has demonstrated that the disorders of the portal circulation, are not always clearly apparent, and that, sometimes, they manifest themselves by the most uncertain and perplexing symptoms; and inasmuch as in most mental affections, the portal circulation is disordered, the existence of such disorders should be assumed, no matter whether apparent or not.

Indeed, whenever any person takes cold; is exposed to impure air in closed rooms, or otherwise; to inhale dampness or fogs; to great heat; insufficient bodily exercise; or suffers from any disorder of his respiratory organs, by which a perfect aeration of the blood is prevented by

the lungs, the disintegrated substances, or the waste of his body, will accumulate in his sanguineous circulation. Then, being too long retained in the system, these substances will generate, by degrees, irritating products; which, by passing into the portal circulation (composed of the blood of all the veins of the stomach, bowels, spleen, and perinæum), and through the most delicate interlobular ramifications of the portal vein, branching off in the substance of the liver, will irritate and contract these microscopical structures, more or less, according to the quantity of the irritating substances, and to their irritating qualities. Thereby, the portal blood is prevented from passing freely into the hepatic veinlets, to be carried towards the heart; producing stagnation of the portal circulation; more or less congestion of the liver, stomach, bowels, spleen, perinæum, and of the gastric and intestinal glands; apt to pervert their secretions, and impair digestion, and also to constipate the bowels. In aggravated cases of this kind, the disease can be easily ascertained; in mild cases, however, by preventing the secretions and excretions, and setting up a great variety of direct and sympathetic irritation, of an obscure character, it will sometimes puzzle the most acute physicians.

Physical affections, in some cases, where no nerve-fibre connected with the cerebral matter is irritated, have little or no influence upon the brain. In other cases, when nerve-fibres in connection with the brain are irritated, one single physical disorder will excite an abnormal or excessive nervous irritability, characterized by great excitability, irascibility, and bad humor. Such a state is not insanity; which springs up only, when the nervous disturbance is aggravated by other co-acting physical or moral influences. So, when a person suffers from ozena, or diseased nasal bones, in the vicinity of the base of the brain, apt to irritate, by contact, the cerebral matter, it will often engender some nervousness, with no other bad effect. If this person becomes at the same time dyspeptic, this state may only increase the nervous irritability. But, when the indigestion is permitted to progress unabated; or the nervous affection is aggravated by the use of alcoholic stimulants, by narcotics, by grief, or by other emotional influences, an attack of insanity is pretty sure to follow; yet easily curable, provided the different existing physical disorders can be overcome. Should, however, the ozena prove rebellious, as it often does in old cases, the mental affections will be only temporarily relieved by the cure of the other disorders, and will return unless great care be taken in avoiding a relapse of the aggravating influences. But in all these cases, in which it is possible to master permanently, all the physical disorders, the nervous affection will also permanently disappear, in spite of the moral influences, if the brain-matter has not already been altered, or destroyed, by the effects of the combined diseases; when, of course, no human ingenuity can reëstablish the brain to its natural condition.

The word mania means madness, or insanity, especially applied when there is erroneous judgment. Acute inflammation of the brain, with high fever, is called phrenitis, or phrensy, attended by delirium, either furious or muttering; and when the membranes around the brain are involved, the nervous disturbance is more severe. Where acute inflammation of the brain is consequent upon a previous deranged state of the mind, or attended by little or no fever, it is called acute mania. Chronic mania is the same malady, only of a milder character; and monomania is the name applied to that form of mental aberration, in which the patient is rational on everything, except one point; as, for example, that he believes himself to be God, a prophet, an Emperor, or that twice two are

three, not four; ideas, which no reasoning is capable of altering. Puerperal mania is the insanity which supervenes in the child-bed state; and kleptomania the insanity with an irresistible propensity to steal. Hysterical mania is that form of a deranged mind, when hysteria, caused by an irritated state of the organs of generation of women, is aggravated by other physical or moral influences; when the usual symptoms of hysteria are modified by a great variety of other, sometimes very distressing phenomena, among which might be mentioned incontrollable desires, loss of consciousness, suspension of volition, and maniacal hallucination. If the disease is manifested by indecent acts, or improper conduct, it is called nymphomania. Hysterical mania, as well as nymphomania, are not permanent, but spring up by sudden attacks, of a periodical character, often excited by vexation, grief, or other emotional influences; and last, in some cases, only a few hours, in other cases, several days. Many other names have been applied, either to particular symptoms or causes; but inasmuch as these names do not change the nature of the malady, which is always the same, namely, delirium, or over-oxydation of more or less cerebral matter, in different parts of the brain, producing different phenomena, the names are only a matter of convenience, to distinguish some of the forms of the disease, but have no influence on the treatment, which depends on the physical causes—different in each particular case.

The name of melancholia has been given to those mental disorders in which the feelings and instincts are perverted; changing, for example, love into aversion, morality into immorality, modesty into immodesty, and the natural attachment for life, into a strong desire for self-destruction. Many persons affected with this disease are gloomy, and feel an aversion for society and friendly intercourse, without any cause, even with their best friends and nearest members of the family. They are also sometimes subject to irresistible unnatural desires, and bear a general strange deportment. Mothers, apparently perfectly sane, killing their children, without any other reason than an irresistible morbid impulse; or persons haunted, day and night, by an irresistible desire to commit suicide, without any cause, are affected with this form of lunacy. It is also well illustrated by the old couplet:

I do not like thee, Doctor Fell,
The reason why, I cannot tell.

This disease has also been called by some, moral, by others, emotional insanity.

The localities of the nerve-centers, in which the feelings and instincts are generated, are still unknown; but by analogy, there can be no doubt that in whichever part of the brain they might be situated, their manifestations are the result of the irritated state of these particular parts of the brain; often by the sympathetic irritation of the urinary passages, by acid urine, or gravel, consequent upon a deranged state of the digestive organs.

Melancholia might exist isolated, as also combined with other forms of lunacy.

Dementia, or idiocy, is that state in which the cerebral irritation or inflammation, with symptoms of mania in its various forms of delirium, or melancholia, having lasted a certain time, have occasioned the permanent disintegration or alteration of more or less brain-matter; impairing thereby forever, more or less, the mental faculties, and sometimes also the powers of motion.

The symptoms of idiocy are well known, and do not require any illustration. In this disease, the damage already suffered in the cerebral substance, cannot be repaired; but this state, being often combined with other forms of mental derangements, by the effect of the organic disorders, by attending on these disorders, the further annihilation of the mental powers can be prevented.

The manifestations of delirium are innumerable. When only the optic ganglia are affected, phantoms, the devil, or other images are seen by the patient, producing a great fear and perplexing his mind. In derangements of the auditory ganglia, he hears voices of persons, sometimes known to him, talking and teasing, and often exciting his anger. In disorders of the olfactive ganglia the odor of substances seem to him different than common. If the disease affects the gustatory ganglia, it is the food that does not taste natural to him; when often he will refuse taking any nutriment or medicines for fear of being poisoned. If the central ganglia are irritated or inflamed, there is an irresistible inclination to talk alone on a great variety of subjects, although reason might still remain unimpaired. But when the convolutions of the brain are irritated or affected, the patient becomes irrational, more or less, according to the importance and to the extent of the disease. When a preacher is in a state of delirium he is very apt to say the same prayers he is accustomed to offer during his religious services. A lawyer will talk on law, a trader on dollars, sugar, or needles. Other persons will speak on those topics which have been most strongly impressed on their minds. Hence, it is evident that the delirium is the involuntary evolution of impressions; or ideas, engraved in the cells of the ganglia by over-oxydation, consequent upon an excess of arterial blood therein, and that therefore, delirium and its effects, are entirely beyond the powers of volition.

Persons affected with cerebral diseases, are seldom aware of their mental condition; and when considerably annoyed by delirium, in any form, attribute their trouble to the effect of supernatural influences.

In many cases of mental aberration, no visible alterations in the cerebral matter can be found after death, showing that the nervous symptoms were dependent on the periodical sympathetic irritation of the brain, by the disordered state of other organs, and sufficiently strong and persistent to effect permanent changes in the nervous tissues. In other cases, more or less inflammation, induration, softening, collections of matter, or other alterations, are found in the substance of the brain. In partial insanity, these changes are present only in one of the cranial hemispheres. In dementia, or idiocy, with permanent loss of a great part of the mental powers, however, the alterations, or the destruction of the cerebral matter, are found on both sides of the brain.

These remarks are not idle theories, but true facts, founded on observation and experience, or the logical deductions drawn from these facts, well known by all the physicians familiar with the minute anatomy and the physiology of the brain, the pathology of the nervous affections, who had occasion to observe lunatics, and to attend on their ailments.

In order to prove the correctness of the facts alluded to, by their partial application, I beg to detail a few, among many cases of insanity, in its various forms, which, in the course of a long private medical practice, have come under my observation.

CASE 1.

The wife of a farmer, aged thirty-five years, having experienced some domestic trouble, had been, for some time, slightly deranged in her mind without any attention being paid to her condition, when, at once, she became a furious maniac, smashing everything and attempted to set fire to the house, declaring that the evil spirit had taken possession of her soul, and that, if she must go to hell, everybody in the house should go along with her.

I ascertained from her husband that she had been constipated for a long time, and that her periods were irregular. I saw, also, of her being in a state of plethora, by which an excess of blood was also kept in her brain.

Diagnostic.—Acute mania, by grief, plethora, derangement of the portal circulation, and some uterine disorder. In meeting her, she told me, as lunatics often do, that she was not sick, did not want any doctor, and refused taking medicines, but added, that, if she must go to hell, her husband should go with her. To this I replied that her desire would be easily accomplished by a powder I would give her as well as to her husband. Thinking that I intended to poison them both, she readily accepted my proposition, and both opening their mouths at the same time took a full dose of jalap and calomel. During the operation of the purgative she became furious, and filled the room with green and black matter expelled by her bowels. But this evacuation relieved her brain to such a degree that on the following morning I found her quite calm. When she saw me she said that doctors had no power over evil spirits, and that Jesus Christ, alone, could deliver her from Satan. She being a Catholic, I procured a prayer book of her creed, and when she observed the image of the Savior on the frontispiece, she kissed it, knelt down, and began reading a prayer. Meanwhile I had tied a bandage around her arm and was in the act of opening a vein, when she asked what I was doing. I told her that, unless a vein was opened, the devil could not get out by her prayers; and, in this manner, was successful in abstracting about one pound of blood. After the operation she remarked that she could feel of her tormentor being partially but not entirely out, when I assured her that I would expel the rest by other means.

Presuming her organs of generation to be in a disordered state, I requested her husband to persuade her to consent to a physical examination, which she positively refused, pretending such an examination to be a sin. In this emergency I had recourse to the kindness of Rev. Father Largan, her pastor, now in San Francisco, who impressed upon her mind that it would be a great sin to oppose her medical treatment. Thereupon she asked him whether, by following the doctor's directions, she would see God after her death, and on being assured that certainly she would, I had no further trouble with her.

The rest of the treatment consisted in minute doses of mercury and saline purgatives, some leeches applied to the neck of the womb, copious vaginal irrigations of warm water, and afterwards, the use of the douche. Thereby she got entirely well after about one month. Two years afterwards, however, some of her bodily ailments having returned, her mind became again somewhat disordered, and her husband, being

unable to take care of her, brought her to the Insane Asylum of Stockton.

CASE 2.

I was requested, not long ago, to see a gentleman, fifty years of age, having the idea that everybody was conspiring against him; and fancied seeing armed men endeavoring to take his life. He had intrenched himself behind his bed, gun in hand, ready to defend himself.

His wife informed me of some difficulties he had with some property; said he had complained of a pain at the pit of the stomach; had passed some pieces of tape worm; and, of late, had been drinking more than common.

Diagnostic—Mania, by grief, gastro-intestinal irritation, and alcoholic stimulation.

Treatment—Podophyllin, oil of turpentine, with castor oil.

Got well in a few days, and has enjoyed good health ever since.

CASE 3.

A lady, forty-five years of age, had been suffering for several years from hysteria, gradually assuming the form of hysteric mania, which, for some time, had manifested itself every month, lasting each time from three to four days, and of late had become of a very violent character—almost like acute mania. Having been called to see her during one of her severest attacks, I could do little for her at that time; but as soon as the paroxysm subsided, I ascertained, by physical examination, of the existence of a very offensive vaginal discharge, having caused numerous corrosions on the neck of the womb, on the vagina, and on the vulva. The uterus was inflamed, anteverged, and indurated on its anterior aspect, and there also were clear evidences of the lady being in a state of anemia and dyspeptic.

Diagnostic—Hysteric mania, by the causes related.

Treatment—Repeated cups and blisters below the loins; vaginal irrigations of warm water; cauterization of the sores; a soft sponge, sometimes with mercurial ointment, and at other times with ointment of iodine of lead, carried in the vagina, and tincture of iodine applied around the naval. Internally, poprine, iron, dandelion, minute doses of mercury, and mild laxatives.

The vaginal discharge soon subsided, and the sores healed; digestion and the blood gradually improved; the nervous attacks became less severe, and lasted a shorter time every month, and after four or five months disappeared entirely.

CASE 4.

A gentleman reported to me, with great consternation, some seven years ago, that his wife—twenty-four years of age, who had always been gentle and kind to him—had been assaulting, for a day or two, in the most unbecoming manner, almost any man passing by her house—attempting to drag them inside for the purpose of having sexual intercourse with her.

When I paid her my visit, she received me well, and did not exhibit a single sign of mental disorder. Being questioned as to whether she was aware of what she had been doing, she told me that she was, but said that she could not help it—being impelled by a force she could not resist,

and was unable to account for. I found, however, soon, the cause of her trouble.

Diagnostic—Nymphomania by plethora, indigestion, light uterine engorgement, and excessive irritability of the organs of generation, consequent upon perverted secretions.

Treatment—Venesection, warm baths, vaginal injection of infusion of German chamomile, small doses of calomel, and saline purgatives.

Recovered immediately, and has been well ever since.

I had another case of the same character two years afterwards, with a lady married only a few days before.

CASE 5.

A well known gentleman in this city had been suffering for some time from a great depression of spirits, gloomy thoughts, and was so distressed in his feelings as to be totally unfit for business. He could distinctly hear voices talking in his ears; was unable to sleep, and haunted day and night with a desire to commit suicide, for no reason whatever. The color of skin evinced a disordered state of his liver, and I was also informed of his urine depositing a brick-colored sediment, evidently by an excess of acids generated in his stomach by impaired digestion.

Diagnostic.—Melancholia by hepatic, vesical, and gastro-intestinal irritation.

Treatment.—Cups to the nape of the neck; hot footbaths; blue pills, with extract of dandelion; laxatives; and flaxseed tea with carbonate and acetate of potassa. Lost by degrees his sleeplessness, voices in his ears, and bad feelings. Recovered entirely after two or three weeks, and has been well ever since.

Now, for what reason should this rational, physiological, and effective treatment not be applied to the patients of the asylums for the insane? Why do the physicians of these institutions not come up to the present state of scientific knowledge, and persist in treating insane persons in an empirical manner, and counteract only the symptoms by resorting, among other means, to opium and its preparations—henbane, hemlock, belladonna, stramonium, Indian hemp, hydrocyanic acid, chloroform (Winslow), or hydrate of chloral (Crawford)—in violation of one of the cardinal doctrines of medicine, teaching that no narcotics or sedatives should be given when the brain is involved in a disease?

Indeed, these medical agents are little more than palliatives; and in certain emergencies are useful as such. Applied in insanity, they will sometimes calm the nervous excitement by stupefying the patient, at the risk, however, of converting curable mania or melancholia into hopeless dementia or idiocy, or inducing even coma and death. There is, therefore, a fearful moral responsibility in administering such substances to the insane, and no physician is justified in doing so, except under the pressure of imperious circumstances—when there is no possibility of acting otherwise. There can be no doubt that many cases of death, in the asylums for the insane, are caused by narcotism, and that not a few cases of idiocy are the effects of these very substances, administered to keep down the excitement instead of removing the cause of the malady.

There are other dangerous practices, in the present treatment of the insane, which it would require too much space to detail. But the fact, that, perhaps, over one half of the patients discharged from the insane

asylums, as cured, relapse again into insanity a short time afterward, is a clear evidence that the different physical causes of the mental disorder, in the respective cases, has never been properly attended to, and that the mode of treating this malady, at the present time, is ineffectual.

This is, moreover, proved by the Reports of the American Hospitals for the Insane (*American Journal of Medical Sciences*, April, 1869); of the New Hampshire Asylum; Connecticut General Hospital; Massachusetts State Hospitals (at Worcester and Northampton); New York State and City Asylums; Frankford Asylum; Mount Hope Retreat; Longview Asylum; Indiana Hospital; Michigan Asylum; Alabama Hospital; and California Asylum.

The aggregate number of patients treated in these institutions is...7,238.

Of which died..... 561, or 7 5-7 per cent.

Discharged, nominally cured.....1,191, or 16 3-7 per cent.

The percentage of the new cases only, admitted and apparently cured during the year, average from thirty to forty per cent; showing a very unsatisfactory state of affairs. And while much care has been given to the improvements of buildings, and other necessities, the medical treatment of Esquirol, in Paris, at the beginning of this century (*Pritchard's Cyclopaedia of Practical Medicine*), was quite as successful as the results obtained to-day, notwithstanding the immense progress made, since that time, by the medical sciences.

The facts and considerations, embodied in the preceding pages, show conclusively:

First—That permanent insanity is caused by the alteration or the irreparable destruction of more or less cerebral matter in both hemispheres of the brain.

Second—That persistent mental alienation is the effect of uncontrollable delirium, or over-oxydation of some parts, on both sides of the brain, consequent upon the persistent irritation or inflammation of those parts by the effect of several often curable physical disorders, sometimes aggravated by moral influences.

Third—That partial insanity is the result of similar influences, physical and moral, when only one of the cranial hemispheres is involved in the disease.

Fourth—That occasional attacks or paroxysms of mental aberration are generated in persons affected by excessive nervousness, or abnormal nervous irritability, by one or more organic disorders, when the nervous affection is occasionally aggravated, or transformed into fits of insanity, by temporary physical or emotional influences, of a shorter or longer duration.

Fifth—That passions, such as anger, despair, or vengeance, are the effect of no physical disease, but spring up by the temporary cerebral excitement and mental derangement occasioned by contrarieties or provocation. Hence there can be no insanity without some kind of physical disorder—no passion, without some kind of provocation or mental excitement; while a voluntary criminal act is performed in cold blood, with evil intent, and without personal provocation. For the possession of property may become a provocation, and excite covetousness or envy, but is not a personal provocation capable of producing anger or vengeance.

In most countries on the continent of Europe, no person is permitted to contract marriage without the consent of the parents; and even after majority, without having accomplished certain formalities. On the other hand, parents cannot dispose by testament of more than a certain part of their property, and after death, the rest belongs, by right, to the surviving parent and to the children, who cannot be disinherited, unless they have conspired against the life of the deceased. In America it is different, and children over a certain age may do on this subject as they please; but if the parents are not satisfied with their conduct, they might be disinherited. Under such circumstances, the validity of wills is often contested by the interested parties, under the plea, that when the will was made the testator was unsound in mind. The testimony in such cases brought forward by both parties is generally contradictory, and unless positive proof of bad health, and other insane acts, can be adduced by the contesting parties, the question turns on the point: whether or not the deceased had any reason to be dissatisfied with the conduct of his disinherited offspring, and had kept up friendly relations with him; for parents, having a natural love for their children, are always disposed to promote their well being, if they have properly behaved. There are other cases, in which priests or ministers, physicians, attorneys, or attendants, exert an undue influence over persons a short time before their death, and obtain legacies to the prejudice of the legitimate heirs, with whom the testator had always been friendly. Such wills are also often contested under the plea of insanity. In these cases it is evident, that while the testator might have been sound in mind his whole life, the disease which ultimately carried him into the grave could not but impair, more or less, his mental faculties; and if such legacies are excessive, there can be no doubt that undue influences had been exerted, and that the testator, when he signed his will, was incapable of fully appreciating what he was doing.

Horace Hawes, the San Francisco millionaire, adjudged insane after his death, had been at a time endowed with superior mental power. By the effects of a gastric and pulmonary affection, from which he had been suffering for several years, however, he had contracted an excessive nervous irritability, attended by a strange deportment and eccentric desires, degenerating into a strong antipathy for his wife and children; although they had always been true, submissive, and kind to him. To them he left by his will only a small pittance; and laboring under the illusive desire for a posthumous fame, he willed the bulk of his fortune to trustees, for the formation of an university. Had he been, like Mr. Peabody, of London, without a wife and children, such an act would have been rational. But to satisfy a childish whim at the expense of the well-being of his family he should have loved, demonstrated a perverted state of the mind; undoubtedly, the effect of his malady.

All men possess a natural instinct for the preservation of life, to which every one clings even when suffering from the greatest adversity; and no man, if not diseased in body, will ever attempt self-destruction as long as he is able to keep his head cool.

Love is the sweetest among the feelings or sentiments, which, when strong, is turned into a passion, and if excessive, leads to imprudent or irregular moral actions. If a man in love with a woman is jilted or trifled with by his sweetheart, such an action might excite his anger and despair to such a degree as to kill the woman, and to attempt to destroy himself afterwards. Such an act is passion, not insanity; and inasmuch as the man had a free choice in his actions, he should be pun-

ished by law, although not with great severity, considering that the homicide was the result of a great provocation. If a woman is disappointed in her love, and kills her lover, she is precisely in the same position. But if this woman is affected by bodily disease, which for many years had subjected her to a nervous affection, liable, on the least provocation, to create attacks of mental alienation, the question is entirely different. If such a woman, after having been disappointed by her lover, takes his life, there can be no doubt that the deed was occasioned by an irresistible morbid impulse, a natural effect of her disease.

In Mrs. Fair's case, the depositions of the physicians, who had attended on her for a long time, have shown, in both trials, that the defendant had been suffering, during many years, from dyspepsia, rheumatic gout, irregularity of her periods, uterine displacements, and other disorders, attended by almost monthly short attacks, sometimes of hysteria, at other times of hysteric mania; at times complicated with melancholia, manifested by strange, capricious notions, irregular moral conduct, and an occasional strong desire to commit suicide:—at one time actually attempted; and also by an attempt to take the life of her mother and child. The defendant had never been a raving maniac, nor an idiot, fit to be sent to the insane asylum. She had always been, apparently, perfectly sane, except during her nervous attacks, sometimes aggravated by atmospheric or by moral influences. Under such circumstances, the strong mental shock received by Mrs. Fair while witnessing Mr. Crittenden's meeting with his family was, in the opinion of her physicians, quite sufficient to unsettle completely her mind, and to suspend, temporarily, the powers of her will.

In the first trial, the jury, influenced by public opinion, set aside the medical testimony, and, without deliberation, found a verdict of murder in the first degree, and caused her to be condemned to death.

In the second trial, in which no other plea than insanity was set up by the defense, the District Attorney did not produce experts conversant with the case, but medical gentlemen, who considered it more from a moral than from a scientific standpoint, and had beforehand expressed their opinion on its merits, mostly founded on the moral points brought to light by the first trial. Such a testimony, therefore, was and could be only confused, contradictory, and unscientific. Some of the physicians were in doubt as to the sanity of the defendant; and one among them was candid enough to express his conviction that the doctors who had seen and studied the case were the most competent persons to judge of the defendant's condition. Yet, all these experts in rebuttal were of the opinion that, at the time of the homicide, she was sane, because, before going to Oakland to witness the meeting, her actions had been rational. They forgot, however, as above demonstrated, that the insane are irrational only in acute mania, in dementia, and in idiocy, while in many cases of mild mania, in monomania, in hysteric mania, in melancholia, and in all the other forms of periodical or occasional mental alienation, the patients are usually perfectly sane, or at least appear to be so, and will talk nonsense or commit insane acts only during the time of their paroxysms. They forgot, also, that lunatics are subject to morbid feelings which they are unable to master, though otherwise they might appear to be perfectly sane.

The doubt as to her sanity, however, saved Mrs. Fair's life, and the jury, who effected this result, were severely censured by public opinion, and by the greatest part of the press in America, although the moral aspect of this case had nothing to do with the medical question, since

scientific facts are not governed by majorities nor public sentiment; for while, until the time of Galileo, the whole world thought the sun was turning around the earth, this unanimous opinion had no influence on the motion of the celestial bodies, and could not alter the laws of nature.

At any rate, even had Mrs. Fair never been affected by any disease, and consequently not been entitled to set up the plea of insanity, her deed had not been an unprovoked murder in cold blood, with evil intent, entailing the penalty of death. In that case it would have been a homicide, excited by passion, consequent upon a severe provocation, which, among all the civilized nations, is considered to be an extenuating or mitigating circumstance; for, whatever might have been her conduct, the correspondence between the parties has proved that Mr. Crittenden had trifled for many years with her affections, and repeatedly had broken his promises, the last of which, at the very moment of the meeting in Oakland, could not but excite a passion scarcely controllable even by the coolest mind. Moreover, there can be no doubt that her moral conduct had been, in a great measure, influenced by her bodily ailments and by the circumstances in which she had been placed, over which she had no control. There is a great difference between a person who, in cold blood, without any personal provocation, kills with arms or with poison a man for the purpose of robbing him of his money, wife, or property; or another man, who thinking himself, with more or less plausibleness, injured, or wronged in his honor, property, or otherwise, by another man, and kills him by the impulse of his passion. In the first case, it is clearly murder in the first degree; while, in the second case, it can be only murder in the second degree. American jurisprudence and juries do not sufficiently discriminate between such cases; and many persons have been hanged in California, although their crimes had been the clear effect of passions which cannot be excited without some kind of personal provocation.

The term "malice," applied in such cases, is ambiguous; and, according to Webster, means to injure others without cause, from mere gratification or spite; with malevolence, which is an act of insane persons only, and therefore does not express correctly the meaning of the law. Nor is the word "premeditation," applied in criminal jurisprudence, less objectionable, inasmuch as there might be premeditation:

First—In an homicide performed in cold blood, without personal provocation; which is murder in the first degree.

Second—In an homicide accomplished, after the mind has been excited, or agitated by some personal provocation, the homicide being more or less justifiable, according to the nature of the provocation and the circumstances connected therewith. For example, if a woman, whose honor is dearer to her than life, is slandered, and kills her slanderer with premeditation, it is not insanity, but vengeance, though generally considered to be justifiable, if the woman has really suffered by the slander. Such a case has been tried, a short time since, in Petaluma, in which a single man, in love with a married woman, had circulated slanderous reports against her chastity, and had attempted to suborn several persons to prove these slanders, with the object of effecting a divorce from her husband, who, believing the false reports to be true, actually separated from his wife. Thereupon she killed her slanderer with premeditation, and was acquitted by the jury.

It is evident that while in anger the mental orgasm is only temporary, and soon subsides, leaving the mind clear, in grief, and after those in-

juries which provoke a feeling of resentment or vengeance; on the contrary, the mental excitement or the moral pain is of a more lasting character, and keeps the judgment on this particular point unsound sometimes for a long time. This phenomenon is observed in the personal as well as in the public mind; well demonstrated by the irrational public feeling in San Francisco against Mrs. Fair, as well as by the last insane acts of the Commune of Paris.

Among the wild Indians, the insane are considered supernatural beings, inspiring them with awe. The Mahommedans hold them to be marabouts, or saints, whose spirit is with God; wherefore, they are treated with great reverence. Among us, who boast to be Christians, certain lunatics were, not much over a century ago, believed to be witches, and burnt at the stake. To-day witchcraft is exploded, but by the fact of people generally being uninformed of all the manifestations of a diseased mind, many insane persons are sent to the penitentiary, if not to the gallows.

Therefore, when a physician is called upon to serve as an expert in a civil or criminal case involving the question of insanity, he should be prepared to enlighten the jury and the lawyers, and answer, to all the questions propounded to him, in a clear, intelligible manner. He should, especially, point out the difference between insanity and passions, and explain their nature and the limits between them; and his opinions should not be based on ideal assumptions, but upon scientific facts, upon which there can be no difference of opinion among respectable physicians. Thereby he will earn honor to the medical profession, prevent errors in the Courts of justice, and promote a correct application of the laws.

REPORT ON PROBATIONARY ASYLUMS FOR THE INSANE IN LARGE CITIES,
BY A. B. STOUT, M. D., OF SAN FRANCISCO.

On a former occasion, before the Medical Society of the State of California, session of eighteen hundred and seventy-one and eighteen hundred and seventy-two, I had the honor to present some suggestions upon the subject of a reform in the care and treatment of the insane in the large cities of California.

The views then stated were hastily advanced, in the hope that some modification of proceedings, in regard to the State Asylum about to be constructed at Napa, might be promptly introduced before it would be too late to alter the system.

Having learned, since then, that those suggestions were favorably regarded, both in the profession and by the community, but could not be acted upon without first obtaining legislative sanction, I now venture to introduce this, in my estimation highly important subject, before the State Board of Health.

With the aid of this Board, the honorable Legislature of the State may be more favorably inclined to adopt the proposed improvements.

To avoid reviewing, I take the liberty to attach hereto the article upon the subject, taken from the proceedings of the State Medical Society, eighteen hundred and seventy-one and eighteen hundred and seventy-two:

PROBATIONARY ASYLUMS FOR THE INSANE.

"The appropriation of the necessary funds by the State of California for the erection of an additional asylum for the insane, and the choice of its location in the beautiful and salubrious Valley of Napa, renders the moment opportune for the discussion of the subject of the care of the insane in large cities. The propriety of locating asylums for this class of invalids in situations remote and secluded from the excitement of cities, refreshed with the pure air of the country, and surrounded with landscape scenery to divert the mind from its distracting griefs, cannot be contested. But these sites have, nevertheless, a number of objections. The object of this paper is to endeavor to overcome these very serious inconveniences.

"The organic element of the American Constitution is the liberty, the perfect freedom, politically understood, of every man; nor can any individual be forcibly deprived of his freedom without due process of law. This truth oftentimes works much temporary evil. So full of wrongs and deceptions are the records of litigation and of crime, that the most acute legislators are driven to their wits' end to provide statutes to meet and counteract them. Hence comes the inevitable provision in law that no person insane, or considered to be insane, can be hastily secluded in an asylum for lunatics, either by his family or friends, without being first presented before a judicial authority, with two sworn medical witnesses as experts, to testify to his insane condition, and even then it must appear that his insanity is of a nature to endanger his own welfare or that of the public at large. It is only under such circumstances that he may be deprived of liberty and committed to the safe keeping of a State insane asylum. Who acts otherwise, becomes exposed to the consequences of expensive litigation and onerous damages. For this reason, also, it is that private asylums for the reception of the insane are deprived the privilege of receiving patients who otherwise might be advantageously entrusted to their care. At this state of things the public, whose intelligence is only fed by its own immediate experience of the day, is sometimes startled to wonder, to find that their application to hurry off an insane person to an asylum, public or private, meets with a check, and are forced to provide for a troublesome burden they cannot safely manage, until the requirements of the statutes shall be complied with. This deference to the law, however, may consume three or four days. Now, what's to be done? Insanity, like time or tide, waits for no man. Its capricious thought strikes on the instant, and laughs at order's discipline. In this fearful family dilemma, who knows what may turn up? The subject of the malady may commit suicide; may kill his wife, or his father, or may kindle a flame to destroy a house, a ward, or a city. The excitement of the moment prevents deliberate action. Much time and money are spent to find nurses, physicians, the Judge, medical experts; and all this care is destined, perhaps, to be frustrated by some desperate act of the maniac. The same uninstructed public is little aware how long is the catalogue in the records of lunacy, of what may be named *imputed insanity*, or to what extent fraud and malice have exercised their ingenuity to accomplish the ruin of their victims. By *imputed insanity* is meant the assertion, generally for fraudulent purposes, that a sane individual is affected with some form of insanity which renders him

incompetent to be at large, to attend to the affairs of his estate, to execute legal documents, and consequently requires to be restrained of his liberty and confined in an asylum. The charge will often be made that the intended victim may be sane on general topics, or at certain periods, but subject to sudden alienations of mind, during which property is sacrificed. Such cases often require several weeks of probation to discover the falsity of the charge. Many a sane person has, on such imputations, been confined, as it were, incarcerated, to his great damage, for long periods in an asylum. This time of seclusion is diligently employed by his enemy to dispossess the victim of his property, or destroy his family. In some instances, the sane man has thus been driven in his despair, to veritable madness. Such a harm does not cease with the detection of the fraud and restoration to liberty. The name stands forever on the register of the asylum, and in future years—in another generation—may be produced to show hereditary insanity in the family.

“In this connection, and in many cases of true incipient insanity, judicious physicians are exceedingly slow and reluctant to sanction the commitment of a patient to a public asylum. An incipient mental alienation of a transitory nature, dependent entirely upon a transitory or temporary irritation of the brain, an arachnitis, as ephemeral as a pleurisy, actually and entirely curable in a week, does not deserve nor require a commitment in lunacy, which compels the record of an individual for all time upon the registers of an insane asylum. Such a registration for all time exposes a family for all time to the imputation of hereditary insanity. A profound wrong, affecting the intermarriages and disposition of estates for generations, may thus be accomplished by undue haste in hurrying a case of ephemeral insanity into forced seclusion. For, after all, a commitment on a petition *de lunatico inquirendo* is a modified incarceration, and carries with it all the results in law which may be derived from hereditary insanity; therefore, it may be repeated, a cautious physician, a true expert, is very loath to pronounce the fiat of insanity.

“Another class of inmates who appear in lunatic asylums, are those who feign insanity. The exquisite finesse with which clever minds assume a *feigned insanity*, often baffles the acuteness of practical experts. Much time, cautious observation, and skillful experiments, are required to detect their cunning artifices. To effect a purpose this feigned insanity will defy reason, and oftentimes win in the encounter of wits; but feigned insanity, when recognized, has no privilege to the refuge of a State asylum. Its charity is abused, and its finances are wasted.

“Now comes monomania upon the stage of life; its protean forms; its infinitely diversified eccentricities; its myriad of phases which defy the skill of the analyst of mental philosophy—so calm and quiet, so genial and polite at one moment, so wild and raving at another, when the wounded organ of the brain is chafed or touched. All these modifications instruct the discriminating mind that they cannot be alike promptly disposed of and dismissed to forced seclusion. A few days of repose will restore many to reason and health. Those who appear inevitably doomed to permanent lunacy can, by a process of probation, be selected without danger of error. The limited time allotted for discussion before the society precludes further illustrations in the analysis of incipient insanity, and its treatment in asylums. If, then, it be admitted that these views are correct, that much harm results from these delays, and that it is oftentimes impossible to arrive at a true decision in doubtful

cases by commissioners on lunacy, then it follows that a great public benefit would result by adopting measures for relief.

"A probationary asylum in San Francisco would apparently afford the necessary refuge. In this institution a person insane, or supposed insane, would be in probation, and consequently not subjected by any writ of commitment to compulsory seclusion. Should a cure be effected during probation, the obloquy which often follows would be spared. The great benefit to be derived, is the quickness with which dangerous attacks of insanity may find shelter and security. Any one conversant with the embarrassments and delays attendant upon the disposal of a person taken suddenly insane, will recognize the advantages of such a subsidiary institution. The insane are generally peculiarly reluctant to appear before a Judge in his chambers for examination. All kinds of persuasions and artful devices are often required to overcome their prejudices. The probationary asylums would facilitate and shorten the process, for the invalid could be immediately transported there, and *there* would then be the most convenient place for the Judge and medical experts to assemble for the examination; and the search into the patient's true condition could be easily repeated as often as necessary. Very few families, and even hospitals, possess the necessary appliances for the management of insanity, but they would be ready in cases of acute disease, for instant use in a probationary retreat.

"As the adoption of sanitary reforms often depends upon the expense to be incurred, something may be said upon the economic value of such an improvement. At first sight, it appears like an extra expenditure of great magnitude to establish an extra asylum in large cities. The old idea is no longer patent that insanity is of a nature so special that only specially educated physicians are capable to understand its phenomena. As the aberrations of the mind are but the evidence or symptoms of the disorder, functional or organic, of the physical structure of the brain, so may the instructed physician, from those symptoms, locate the malady to its anatomical relations in the brain, the same as in diseases of the lungs or heart. If, then, the ephemeral diseases of the brain, like those of the lungs or heart, after a fair probation, are left to the general profession, a great abatement in the statistics of insane asylums will appear. What is expended on a probationary asylum, would be deducted from the cost of the rural institution. It is quite certain that if a careful elimination of doubtful, transient, or easily curable cases were thus made, that an auxiliary asylum to that of Stockton would not have been required. If, by the possession of a probationary institute, with its necessary appliances, the frequent cases of delirium tremens, of cerebral alcoholism without delirium tremens, of mania, or less acute insanity from menstrual disturbance, or uterine disease, were abstracted, how great would be the reduction in the statistics of the insane asylum, and the records of hereditary insanity. Thus, it might possibly be shown, that an actual economy would result from such a sanitary reform.

"As, however, I feel myself called to order for the lack of time, I respectfully submit, in brief, the above suggestions."

The department in medicine of mental philosophy, at the present day, enters more than ever into the domain of the general surgeon and physician. Psychology is no longer the holy land of the metaphysician. The ages when mental diseases were an isolated class among the infirmities of man; when mind was considered an ethereal emanation apart from

matter; when the soul had no further relation to the body than a tenant to a landlord, responsible to return it in as good condition, wear and tear excepted, as received, to the owner; or, intended as a gem in its golden setting, only to adorn and beautify its elegant workmanship; then were the wonders of psychology shut up in a casket, closed to all but priests and scholastic philosophers.

In those dark times, the diseases of the mind were regarded as divine punishments, and as such, to interfere with them was a sin of utmost temerity. To increase their poignancy was sometimes deemed a merit. But now, with the progress of mental and physical science, and the union of all departments of science in the investigations of medicine, philanthropy has found her true auxiliary and ally. Mental alienation, as now accepted, is only a symptom. Overwhelming, as often that symptom may be, it is but the evidence and testimony of the disorder of a material organ—the disturbed function of the organic brain. Every organ of the body having its ordained function as endowed by the Creator, finds in its diseased conditions no other expression for its suffering than exaltation or depression of those functions: viz., the disordered processes of matter in the organs of vegetative life—the disordered emanations of mind in the organs of intellectual and moral being; hence it is, that the physician may “minister to the mind diseased.”

Mental disturbance is very often the first precursor of physical disorder. The overwrought brain will utter its first complaint by mental signs, and that “change of character,” so often witnessed and spoken of, as from amiability to moroseness, intense irritability, in persons whose brain is beginning to yield under the pressure of care, is often the warning prelude to insanity.

It is easy, then, to understand how great must be the advantage of preventive care at the opportune moment, and without exposure to public notoriety.

The idea, to establish probationary asylums in large cities, endowed by the State, is based upon the urgent necessity, the pressure of which is every day increasing, of finding some corrective to the embarrassments, abuses, and expenses, which fall with most discouraging weight upon the first cares to be bestowed in cases of insanity; and secondly, to obtain relief for the demoralizing influences, as well private as public and professional, which surround the medical jurisprudence of the present day. In the first category of cases, the care of the innocent insane, struck more or less suddenly in the midst of their avocations with cerebral disease, the kindest and most devoted relatives and friends are baffled and disheartened—in a word, they quit the responsibility because they either know not, or have not the money and time to overcome the difficulties. In the delays of this dilemma, the sufferer is often sacrificed.

In the second category of cases, the inconsistencies and abuses in medical jurisprudence, as well criminal as non-criminal, the state of public opinion is a libel and a lie upon both medical and legal ability; but it impinges with peculiarly arid expression upon the medical department, in consequence of the peculiarly false position in which it is involuntarily dragged before the community by the imperative subpoena. In all its manifold physical distresses, the public flies to the medical man for relief, and as far as it can estimate, will accept none but the most competent; but yet, when unfairly corraled in a Court, is but too happy to catch him foul, and hold him up to contempt or ridicule.

Now, from this wrong dealing, the profession is entitled to seek

redress. It is most true, that all the professions—theology, law, and medicine—possess adherents whose education is insufficient, and, happily for their vanity, the most insufficient are the most unconscious of their mental condition; but it is certainly sure, that the medical profession, when fairly interrogated, maintains its dignity, and supplies in medical jurisprudence the scientific truths without which the law cannot adjudicate justice and equity.

At the present time, when the finest finesse enters into all litigation, the plea of insanity is converting trials in every department of law into cases of medical jurisprudence.

With probationary insane asylums, the bulk of these tergiversations may be evaded. Of course, no fortress can be built which shall present no vulnerable point. Illustrations too numerous for this paper might be cited; but I will select one of great importance—one which is truly a stultification of law in the appeal to medical experts for medical instruction—and for which the system of probationary asylums may be made to afford relief.

If in trials, which involve the question of insanity, medical men receive a subpoena-command to appear, *volens volens*, as law abiding citizens, to elucidate some doubtful or contested points of psychological disease, and are instructed to appear and so do, “for the defendant,” or “for the plaintiff,” why should they not at once be made partisans and be retained and paid with handsome fees, the same as the legal expert, by the defendants and the plaintiffs? By the present anomalous procedure, he is solemnly invited to sacrifice truth, and subject the interpretation of testimony to the utmost possible elasticity of an inventive imagination in behalf of the subpoenaing party. How damning, then, to that party if his own expert happens to testify unfavorably.

The whole idea, therefore, of summoning experts, as *pro* or *con*, is one of those contradictory absurdities which yet cling to the law, like many old, perversely-maintained dogmas in religion, or old effete injunctions of medicine.

A medical expert, if required at all, must be dependent upon the truth of science, and independent of Judge, counsel, or jury.

It is by this false system of interrogation that medical experts are brought into unmerited disrepute. Under the guardianship of probationary asylums, competent experts, entirely disinterested, and duly compensated, irrespective of special litigations, might be elected. Their opinions would be scientifically impartial, and their entire time might be devoted to that professional specialty.

The subject invites to much more exhaustive discussion, but the nature of this report requires only a condensed statement of the advantages sought to be obtained.

First—Then the creation of probationary asylums for the insane, will insure prompt relief for the cure of persons afflicted with cerebral disease.

Second—Inaugurated under the protection of the State, and sanctioned by the legislative voice of the people, the plan will receive universal respect, and the support of law.

Third—It will protect individuals from false imprisonments and accusations, and the public from false testimony and legalized imposition.

Fourth—The system will purify judicial tribunals from venal and assorted testimony, and so economise time and expense in litigation.

Fifth—It will insure a board of disinterested experts (political interlopers excepted) to aid legal authority in the administration of equity.

Sixth—It will, by giving due time for recovery in ephemeral attacks of mental alienation, guard the record of families from the taint of hereditary insanity, unless inevitable by the force of facts.

In drafting a bill for the adoption of the Legislature of the State, the following conditions might be expressed:

First—The Legislature enact that Probationary Asylums for the insane in the State of California may be established in every city of — thousand inhabitants.

Second—Any individual insane, or supposed to be insane, may be received in said asylum on probation, and as such may be restrained of liberty without act of “de lunatico inquirendo,” the same as in general hospitals.

Third—The destitute may be received at the cost of the State.

The non-destitute shall pay.....	\$——	per day.
As taxpayers, for assessment— \$500.....	——	“ “
As taxpayers, for assessment— 1,000.....	——	“ “
As taxpayers, for assessment— 5,000.....	——	“ “
As taxpayers, for assessment— 10,000.....	——	“ “

Fourth—The probationary term shall not exceed ninety days; after which, if the individual remain insane, such person may be transferred to the general Insane Asylum by the usual process of law.

Fifth—The official staff of the probationary institution shall also comprise a Board of Referees in Lunacy, to which Board the legal tribunals shall have recourse in all cases in which questions of medical jurisprudence in lunacy, requiring the intervention of medical experts, shall arise.

The said Board of Referees shall consist of — physicians, regular graduates in medicine, appointed by —, and paid an annual salary of —.

The Board of Referees shall certify as to the state of health of all persons treated in the Asylum, to the date of their departure; but no such certificate, or any record of cases in the Asylum, shall be used as testimony in Courts; nor shall any such records be available, as legal evidences of hereditary insanity.

In an economic view, it is evident that the local probationary institution, besides sparing the costly traveling expenses incurred to and from the general Asylum in the country, will relieve the rural establishment of a very large percentage of easily curable insanity, and of cases which truly belong, except for the inconveniences of the mental symptoms, to the general practitioner of medicine. The expenses, therefore, of the general Asylum, will be greatly relieved. On the other hand, the large and productive farm of the rural institute will provide nearly all the required provisions for the city establishment. By this recourse a large amount from the extravagance and speculation, incident to the contract system, will be saved to the State.

To promote this economy, also, it should be constantly borne in mind that philanthropic institutions should be held independent of political appointments.

MEDICAL TOPOGRAPHY, CLIMATOLOGY, ETC.

In the last biennial report, some account was given of the general climatic features of the State, illustrated by meteorological results derived from competent observers in twenty-seven different localities. It is not deemed necessary to go over the same ground at this time, especially as there seems to be nothing remarkable in the meteorological records during the year eighteen hundred and seventy-two. There has been little or no deviation from the means already ascertained, and no obvious connection presents itself between the facts therein set forth and the death-rate, other than the usual increase of mortality after the decline of the Summer temperature, as shown in our table of mortality by months. There can be no question, however, that the extent of territory, and variety of climate and soil, within the limits of the State, render it a peculiarly favorable one for gaining valuable and comprehensive knowledge of the influence of various conditions upon the rate and causes of mortality. There is here an opportunity to compare, in the northern and southern parts of the State, counties differing by nine degrees of latitude; sea levels with elevations of eight thousand to ten thousand feet; and, what affords an unusual contrast, seacoast valleys chilled by an Arctic current, with vast interior prairies of almost tropical temperature. Doubtless, when sufficient time shall have been given to the study of these conditions—in connection with the death-rate as well as the birth-rate—the result will be a demonstration of important relations between them. Man's "struggle for existence" is largely with the elements. As has been pointed out by others,⁽¹⁾ the progress of the human race has been almost completely controlled by climate. Only within certain limits has man been able to live and progress—the obstacles outside those limits heretofore proving too great. The most favorable climate has been shown to be where the mean temperature for the year is about forty-eight degrees to fifty-two degrees Fahrenheit; and along this isothermal line are a great majority of the most prosperous cities and countries. Human life and progress is there subject to the most favorable circumstances. The advance of knowledge, like this we are here seeking, will enable man to overcome many unfavorable conditions; to make progress in climates in which it has been difficult, and will tend greatly to increase the chances of life in the most favorable locations. With these ends in view I have solicited information from every quarter, and will gladly furnish proper blank forms—which have been prepared—for the uniform record of daily meteorological observations. As a model for this purpose, and for reporting the annual results to this office, is here inserted a valuable contribution from Turlock, Stanislaus County, by J. W. A. Wright, which originally appeared in the *Mining and Scientific Press*:

CLIMATE OF SAN JOAQUIN VALLEY.

A farmer's steady work and busy thoughts in laying the foundation for another crop, have delayed the preparation of a report in full for eighteen hundred and seventy-two of the temperature and rainfall of our inland climate. But here it is at last, made out for twelve months

(1) Disturnell, as quoted in third annual report of births, marriages, and deaths, in Michigan, for the year eighteen hundred and sixty-nine.

on the plan adopted for the past year. It enables us to approximate, for the first time, from actual observations for this part of the San Joaquin Valley, the average and range of temperature for the year, as well as for our Spring, Summer, Autumn, and Winter. I say to *approximate*, for we must remember, that to arrive exactly at such general averages for any climate, requires similar observations to be accurately made, recorded, and calculated for at least ten years; indeed, it is almost the work of a lifetime. Such as it is, however, permits the hope that it will not be a useless contribution to aid some future worker in making out the meteorology of our State. We have tried, by careful calculations from at least a thousand observations made in the course of the year, at or near the hours indicated, to form an accurate and trustworthy

TABLE OF TEMPERATURE AND RAIN-FALL.

YEAR 1872.	Average temperature.			Monthly mean.	Highest temperature.....	Lowest temperature.....	Rain— <i>inches</i>
	7 A.M.	2 P.M.	9 P.M.				
January.....	40.20	52.30	46.15	46.21	61	27.34	2.38
February.....	44.68	59.11	49.69	51.16	67	34.33	2.42
March.....	46.16	63.60	50.40	53.38	70	36.34	1.45
April.....	48.21	66.40	50.80	55.13	77	36	0.97
May.....	56.45	78.39	58.65	64.49	90	40	0.00
June.....	64.57	86.86	65.25	72.23	110	52	0.18
July.....	68.23	92.48	71.15	77.28	104	61	0.00
August.....	69.68	91.72	71.95	77.78	110	59.51	0.04
September.....	63.59	88.25	69.37	73.74	101	43.58	sprinkle.
October.....	50.57	77.19	57.25	61.67	94	38.58	sprinkle.
November.....	39.68	63.56	47.46	50.21	72	23.49	0.28
December.....	36.74	56.77	41.57	45.02	63	10.53	4.70
Annual.....	52.39	73.04	56.64	60.69	110	10	12.42

Our locality, as has already been mentioned in the *Press*, is on the plains of Stanislaus County, midway between the Sierra and Coast Range Mountains, and about half way between the Tuolumne and Merced Rivers. As we are not far from the center of the great grain-producing region of the San Joaquin Valley, our climate may be correctly taken as a type of the climate of the entire valley.

Let us briefly discuss the observations, and record results. It is seen that the table gives:

First—The average temperature for each month at seven, two, and nine o'clock; also, the monthly average.

Second—The average temperature for the year at the same hours, as well as the annual average.

Third—The highest and lowest temperature the thermometer indicated each month and for the year.

Fourth—The amount of rain in inches and hundredths for each month and for the year.

A few words of explanation about the manner in which these averages were obtained.

For each month, all the observations at seven A. M. were added and divided by the number of days on which the temperature at that hour

was noted. The same was done for all the observations at two and nine P. M. To obtain the monthly mean, these average temperatures for seven, two, and nine, were added and divided by three. For the year all the monthly means were added and divided by twelve.

The rainfall for eighteen hundred and seventy-two, 12.42 inches, must not be confounded with that of the wet season of eighteen hundred and seventy-one and eighteen hundred and seventy-two, which was about sixteen inches; nor that of eighteen hundred and seventy-two and eighteen hundred and seventy-three, which to date of writing is about ten inches. Also, our having no rain in May should be remembered as a very uncommon occurrence. Eight miles east of us, on the Merced, and forty miles southeast along the Chowchilla, more than half an inch fell that month. We generally have as much or more. But in dry Springs, like the last, it is usual for our rains to come in spots and streaks throughout the valley.

Two points of special interest, in such a table, to which we wish to call attention, are the average and range of temperature for the year. As was mentioned in a previous article, the decimals of temperature are needed only for accuracy in calculations and comparisons. For practical purposes they may be dropped, and if over one half, the preceding degrees should be called one greater.

1. The average temperature at seven A. M. is seen to be fifty-two degrees; at two P. M., seventy-three degrees; at nine P. M., fifty-seven degrees; and the annual average, sixty-one.

The latter is the most important item in the entire table, as it gives the means of correct comparison with other climates throughout the world.

By adding the averages for the months composing each season, and dividing by three, we obtain the following average temperatures: For Spring, fifty-eight, or one degree above the average at nine P. M., for the year; for Summer, seventy-six, or three degrees above the average at five P. M.; for Autumn, sixty-two, or one degree above the general average for the year; for Winter, forty-seven, or five degrees below the average at seven A. M.

2. By range of temperature is meant the difference between extremes of heat and cold. From the table, this can be obtained for each month and for the year. At present, we shall call attention only to the annual range, one hundred degrees.

The highest temperature recorded is one hundred and ten, in June and August; the lowest, ten, in December. This makes the range for the year one hundred degrees, which is exactly the same as the range of temperature found to exist in the central portion of the cotton States.

We had the coldest weather, by six degrees, last December, that has been experienced on our plains for five Winters past. The lowest previously observed was sixteen degrees, in December, eighteen hundred and sixty-nine. Last Winter we had ice an inch thick. In one instance, within the knowledge of the writer, the ice was so thick on a deep slough along the Merced River, as to enable a man of over one hundred and fifty pounds weight to walk across it without difficulty. The like has not been known in this part of California for many years. More than once the Coast Range Mountains were white with snow for several days at a time.

Even in portions of San Joaquin Valley, during one storm, a few flakes of snow fell. This is a great rarity. Occasionally we have had a small amount of fine hail. As eighteen hundred and seventy two has been rather a cool year, its average temperature of 60.69, or sixty-one degrees, will probably be proved, by future observations, to be somewhat lower than the general annual temperature of our climate. It is, however, such a medium temperature as we would reasonably expect between the mean temperature at Sacramento, to the northward, which is given as 59.90, and San Diego, toward the south, which is sixty-two degrees. By comparing our California temperatures with remote localities, in various parts of the world, we arrive at the following general results:

While the mean temperature of San Francisco is nearest to that of Bordeaux (France), Pekin (China), and New York, that of our inland valleys, and Southern California, is almost identical with that of Southern France, Central Italy, and Southern Japan. To the latter, we might also add the Holy Land and that portion of the Southern States along the Valley of the Tennessee, in North Alabama, around Huntsville and Tusculumbia, where the average annual temperature is not far from sixty-one degrees.

The following table will show more plainly wherein these climates agree, and how they differ:

TEMPERATURES OF VARIOUS LOCATIONS.

PLACES.	MEAN TEMPERATURE.			Range bet. west and south	Latitude north
	Year.	Summer.	Winter.		
San Francisco.....	55.85	50.59	58.97	8°	37° 47'
Bordeaux.....	56.48	42.08	70.88	29°	44° 50'
Pekin.....	54.86	26.42	82.58	56°	39° 54'
New York.....	53.78	29.84	79.16	49°	40° 40'
Sacramento	59.90	48.46	70.77	22°	38° 32'
San Joaquin Valley	60.69	47.46	75.75	28°	37° (about.)
Rome	60.44	45.86	75.20	29°	41° 53'
Marseilles.....	59.00	45.50	72.50	27°	43° 17'
Nagasaki	60.80	39.38	82.94	44°	32° 45'

The column for range or difference between the Summer and Winter of respective climates has been estimated in the table to show that though the annual temperature of various places may agree closely, their differences between extremes of heat and cold may vary greatly. Indeed, this is the chief mark of distinction between climates. The range between Summer and Winter averages in San Francisco is only eight degrees, which makes it as an equable climate one of the most wonderful in the world. In our inland valleys, in Bordeaux and in Rome, the range is three times as great; in Japan, five times; in New York, six times; and in Pekin, seven times as great.

The most striking agreement we find is between our temperature in San Joaquin Valley and that of Rome. Both the averages and range are almost identical. The remarkable similarity between the climates of parts of California and Italy, which has been so often asserted, is not then a dream, but is proved to mathematical certainty by the stubborn logic of facts.

For the same purpose with which the foregoing observations respecting the climate of the San Joaquin Valley have been recorded, as well as to apply a corrective to former publications, the following table of the temperature of San Diego, with the accompanying remarks, is here inserted. Representing the coast climate of the extreme southern part of the State, it is very valuable, and affords a strong contrast, not only with the interior valley climates, of which Turlock affords an example, but also with the sierra climate of the northern portion of the State. (1) The observations for San Diego were taken by the Signal Service Observer of the War Department at the hours of 4.55 A. M., 1.55 P. M., and 8.55 P. M.—such being the hours corresponding with those at which the observations are taken at Washington, viz: 7.35 A. M., 4.35, and 11.35 P. M.—the difference of time between San Diego and Washington being 2 h. 40 m.

WAR DEPARTMENT, SIGNAL SERVICE, U. S. A., }
OBSERVER'S OFFICE, SAN DIEGO, (Cal.) }

TABLE OF TEMPERATURE

Showing the mean of the 4.55 A. M., 1.55 P. M., and 8.55 P. M. observations of the thermometer for each month, the monthly and yearly mean, maximum and minimum temperature, extreme range, and maximum and minimum daily range during the twelve months ending October thirty-first, eighteen hundred and seventy-two:

MONTHS.	Monthly mean of the 4.55 A. M. observations	Monthly mean of the 1.55 P. M. observations	Monthly mean of the 8.55 P. M. observations	Monthly mean of the 4.55 A. M., 1.55, and 8.55 P. M. observations.	Maximum temperature during the month.....	Minimum temperature during the month.....	Extreme range during the month.....	Mean daily range.....	Maximum daily range..	Minimum daily range...
1871.										
November.....	52.10	66.66	56.96	58.57	78.	41.	37.	14	25	3
December	51.70	64.51	55.16	57.12	81.	43.	38.	13	27	5
1872.										
January	46.45	60.64	53.83	53.65	73.	38.	35.	14	26	5
February	46.86	61.58	53.45	53.96	68.	43.	25.	11	18	6
March.....	50.74	63.29	50.06	54.69	71.	44.	27.	13	23	6
April.....	50.01	62.66	54.76	55.81	74.	43.	31.	13	23	3
May	56.12	66.32	58.67	60.37	83.	49.	34.	10	27	5
June	60.03	71.50	60.14	63.89	83.	55.	28.	12	23	7
July.....	63.25	73.00	64.83	67.01	75.	58.	17.	10	14	8
August.....	65.16	74.54	67.03	68.91	86.	60.	26.	9	15	6
September.....	61.13	73.00	64.40	66.17	80.	54.	26.	12	18	6
October	57.80	69.09	60.74	62.54	87.	45.	42.	12	31	7
Yearly mean...	55.11	67.23	58.35	60.22	78.25	45.5	30.5	12	22	5.5

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(1) For some account of the sierra climate, see article, "Lake Tahoe—Hot Springs."

It is shown in this table that the greatest range between the monthly means does not exceed fifteen degrees. The maximum yearly mean reached 78.25° , while the minimum yearly mean was 45.05° , making the range for the year 33.20° . We have no record of any other place except Santa Barbara, that reveals so equable a climate. During the year embraced within this record, the prevailing winds were from the north-west, and had a mean daily velocity of one hundred and fifty-eight miles, aggregating for the year fifty-seven thousand nine hundred and thirty miles. The mean daily velocity of the morning and night observations was three miles per hour, and at mid-day thirteen miles per hour. These are interesting facts, showing that the force of the wind is at no time unpleasantly strong—while it is also strongest when most needed—when the sun is crossing the meridian. The rainfall during the year was six and one half inches.

In preceding remarks it has already been stated, that the greatest mortality was not coincident with the highest temperature, but occurred two or three months after that period. It would seem, therefore, as shown by the above observations, when compared with Mortality Table No. 2, that there is a correspondence between the time of extreme daily range of the thermometer and months having greatest mortality. This is in accordance with the results of our own meteorological observations and mortality tables for twenty-two years past. In looking these over, we invariably find that, whenever any extraordinary degree of mortality prevails, it has been in the Autumnal and early Winter months. This grouping of facts points also to the accumulated effects of long continued Summer heat, impairing the vital resistance to causes of disease, and possibly, in some extent, to the effect of the withdrawal of this powerful natural stimulant. At this season the oceanic winds have died out, and there is a stagnant condition of the atmosphere. Every cesspool and sewer in our cities and towns tells its disagreeable story. In the country, the atmosphere is stagnant and full of dust, as is also the vegetation, and, although the earth is parched and arid, still the springs and rivulets begin to rise and demonstrate the increasing humidity of the air, while the nights become quite chilly. Given the knowledge of these facts, doubtless, the excessive mortality at this season may be greatly controlled or lessened; for an important step is made towards overcoming unfavorable influences, when we learn their essential nature. Indeed, it seems plain, that whenever the effects of such causes shall be fully appreciated, they may be reduced to a minimum, by avoiding draughts of air in our sleeping apartments, by proper clothing, and frequent changes corresponding with changes of temperature, and by means of properly regulated artificial heat. We can now merely glance at the questions herein involved, and not attempt to study or show how much is due to each of these several causes. Such problems can only be fully elucidated by thorough analysis of data supplied by long, continuous, and numerous statistical observations.

Of one fact there appears to be but little reason to doubt, and it is, that the geological formation of a locality has very great influence on the rate of mortality from certain causes. We know that retentive, clay subsoils, keep the air over large districts of country always more or less damp and unhealthy, while self-draining, gravelly, or sandy subsoils, produce the opposite effect. For the same reason, the configuration of the ground is also important, for a flat or concave surface will allow the accumulation of water, which can scarcely be drained off, but must escape by evaporation, and promote malarious and other diseases,

as has been ascertained to be the case in Folsom, and other places where reservoirs and ditches, holding water for mining purposes, have been introduced. Every country physician will be able to call to mind the spots where fever most frequently requires his presence, and they will usually be found to be low-lying, misty places. The character of the water supply depends, too, upon the geological formation, and its importance becomes more evident when we reflect upon the proclivity of the inhabitants of hills, or valleys between them, to cretinism and goitre, and other diseases attributable to the salts of mountain springs and streams, which vary with the substrata. The examination of this latter subject has lately received an impulse, on account of the numerous mineral springs and wells that have been discovered. Eventually, we must receive the benefit of the great increase of knowledge pertaining thereto, which will result from the additional examination it is constantly undergoing.

MINERAL WATERS AND SPRINGS.

In no other part of the world, perhaps, do mineral waters abound in greater variety than in California. They are found in almost every section of the State, at different altitudes, and every year is adding new and valuable discoveries. To the general reputation they possess, as simple *hygienic* agents, are superadded the great attendant advantages of every diversity of climate here found suited to all the varying shades and phases of tubercular and other chronic diseases, which must necessarily make our State a popular place of resort for invalids from other portions of the world. Any information, therefore, relating to them, it is believed, would be important and advantageous to people abroad and to the State at large. For these reasons I propose to appropriate a portion of this report to the consideration and description of all waters in general—the methods of forming an opinion as to their qualities, and to indicate with as much plainness as possible the nature and medicinal properties of most of the mineral waters which are now known in California. In doing so, I shall avail myself of all that has been contributed by others—especially by Professor J. D. Whitney, in the volumes of the Geological Survey, by Dr. F. W. Hatch, in the Transactions of the State Medical Society; by Dr. George C. Walton, in his recent work on the Mineral Springs of the United States; and by C. A. Meneffee, in his “Sketch Book of Napa, Sonoma, Lake, and Mendocino Counties”—not forgetting the standard work of Dr. E. A. Parks, on “Practical Hygiene.”

The rain falling on the surface of the earth, partly evaporates, partly runs off, and partly sinks in. The relative amounts vary with configuration and density of the ground, and with the circumstances impeding or favoring evaporation, such as temperature, movement of the air, etc. Penetrating into the ground, the water absorbs a large proportion of carbonic acid from the air in the interstices of the soil, which is much richer (two hundred and fifty times) in this gas than the air above. It then passes more or less deeply into the earth, and dissolves everything it meets with, which can be taken up in the time, at the temperature, and by the aid of carbonic acid. In some sandy soils there is a deficiency of carbonic acid; and then the water is also wanting in this gas, and is not fresh and sparkling. Every fissure of the earth is permeated by this solvent. It collects in the depths of our mines, or drips from the roofs of caves and railroad tunnels through solid rocks so dense as to turn the

hardest steel. When water has thus passed through thousands of feet of dense rock, and in the passage occupied years or centuries, it is not surprising that it frequently contains a large amount of ingredients. And when a stream of water, thus impregnated, becomes imprisoned between almost impermeable strata, it flows till a fissure in the overlying strata is encountered, when, by hydrostatic pressure, it is forced up and bursts from the earth as a mineral spring; of which the Tuscan Springs, hereinafter described, afford an example.

The chemical changes and decompositions which occur in the earth by the action of carbonic acid, and which are probably influenced by diffusion and pressure as well as by temperature, are extremely curious, but cannot be entered upon here. The most common and simple are the solution of carbonate of lime, and the decomposition of silicate of lime and soda by carbonic acid, or alkaline carbonates. The general result of solution and decomposition is that the water of springs often contains a great number of constituents—some in very small, others in so great an amount that they can only be used medicinally. The temperature of the water also varies, and is chiefly regulated by the depth. The temperature of shallow springs alters with the season; that of deeper springs is often that of the yearly mean. In very deep springs, as in some artesian wells, the temperature steadily increases with the descent—after a certain point below the surface of the earth—varying according to the zone and constitution of the soil. At Paris this point is thirty feet, and the rate of increase is 1° Fahrenheit, for every fifty or fifty-five feet below. The artesian well near Minden, in Prussia, is two thousand and ninety-four feet deep, and the temperature 89° ; that of Mondorf, in Luxemburg, two thousand two hundred and seventy-eight feet, and the temperature 108.5° . In the United States, the artesian well at Louisville, Kentucky, is two thousand and eighty-six feet deep, and the temperature of the water 86.5° ; that of Charleston, S. C., is one thousand two hundred and fifty feet deep, and the temperature of the water is 87° . In Stockton, California, the artesian well is one thousand one hundred and three feet, and the temperature of the water, on reaching the reservoir, is 78° Fahrenheit.

All waters possessing an unvarying temperature of eighty-five degrees of Fahrenheit, or above; are termed *thermal*. This term is used in the sense of heat as indicated by the sensations of the body, although, geologically speaking, all springs are considered warm, or thermal, the temperature of which exceeds, however little, the mean annual temperature of the place at which they rise. Accordingly, a spring of a certain degree would be called warm in Iceland, and cold at the equator. Waters of eighty-five degrees Fahrenheit will convey a sensation of warmth to the hand of most persons on first immersion, though if the entire body were placed in the water, a feeling of chilliness might be experienced. Waters of from seventy degrees to eighty-five degrees Fahrenheit, may be termed temperate; from eighty-five degrees to ninety-two degrees, they are tepid; from ninety-two degrees to ninety-eight degrees, they are warm, and from ninety-eight degrees upward, they are hot—all, except the first, included under the term thermal. Thermal waters are chiefly used for bathing, and in this their efficacy mainly consists. This subject will again be adverted to in speaking of the effects of using different kinds of tepid, warm, and hot waters.

It will be seen from the figures given above, that the temperature of water flowing from great depths is uniformly elevated. The temperature, however, is not always in proportion to the depth. This arises

from the fact that water, flowing from the bottom of a well, may intermingle with colder water from the strata above, producing a lower temperature than would be expected; or the vein of water supplying the well may arise from a much greater depth, giving an unusually high temperature, as is probably the case in the Charleston well. Having thus seen the origin of springs from meteoric water, it is unnecessary to consider the variations in the temperature of cold springs, which depend on the source of the water, whether from melting ice or snow, whether flowing superficially through alluvial earth or deeply through ledges of limestone, or masses of granite.

Mineral waters differ in so many respects from ordinary water, that in order to ascertain the characteristics they are generally submitted to physical, microscopic, and chemical examination. Physical examination, although not capable of furnishing positive results, is useful in suggesting whether the water under consideration is worthy of more thorough examination, but at best, affords very limited information. The following approved plans of procedure are here inserted, in the hope that the observative and reflective faculties of our reason may be awakened to the full import of the whole subject, and thus lead to the discovery of new and valuable mineral springs, and, what is better, to their exhaustive analytical investigation.

Physical examination.—Shake up the water; place some of it in a long glass, and allow it to stand for twenty-four hours to collect the sediment. Then note the following points:

Color and transparency.—Turbidity, which may be permanent, is given by finely divided clay, vegetable matter, chalk, and ferruginous sand. Color is given especially by decomposing vegetation, peat, and animal matters. The depth of the color is no indication of the amount. The water from farm yards is often highly colored, but sometimes contains but little organic matter, while, on the other hand, a large quantity of dissolved organic matter may exist in a perfectly colorless water. A red color is frequently seen in chalybeate waters, and results from the precipitation of the red oxide of iron. In some instances it is due to microscopic algæ.

Taste.—Although naturally much relied on, and useful if large quantities of foreign substances are present, taste is not a good guide. Iron is the only substance in small quantity detected with great certainty by taste. That a water is tasteless is, therefore, evidence only of freedom from very large impregnation with salts and organic matter. When the water is warmed to eighty-six to ninety-five degrees Fahr., any taste is more perceptible than when the water is cold. A paper in the British Army Medical Report for eighteen hundred and sixty-two states very clearly the limits of taste. They are as follows:

Chloride of sodium is detected when it reaches.....	75 grains per gallon.
Chloride of potassium is detected when it reaches.....	20 grains per gallon.
Chloride of magnesium is detected when it reaches.....	50 to 55 grains per gallon.
Sulphate of lime is detected when it reaches.....	25 to 30 grains per gallon.
Carbonate of lime is detected when it reaches.....	10 to 12 grains per gallon.
Nitrate of lime is detected when it reaches.....	15 to 20 grains per gallon.
Carbonate of soda is detected when it reaches.....	60 to 65 grains per gallon.
Iron is detected when it reaches.....	2 grains per gallon.

Smell detects sulphuretted hydrogen in very small quantities. Calcareous waters, containing a large proportion of sulphate of lime, frequently disengage sulphuretted hydrogen by decomposition of the sulphate in presence of organic compounds. Other waters emit odors depending

on the soil through which they have passed. Suspended or dissolved decomposing animal matters in large quantity will sometimes give a foetid smell.

Touch.—The only evidence derivable from this sense is in washing—hard waters, containing the earthy salts, forming an imperfect lather with soap. When the feeling which water imparts in contact with the skin, is peculiarly bland and soft, it is referred to texture; a word intended to represent the sensation of harshness or smoothness. Certain waters possess a smooth texture in a remarkable degree. While immersed in them, the entire surface of the body seems as though covered with a bland oil; the fingers, when rubbed together, are unctuous, as though they had been anointed, and this peculiar sensation of smoothness frequently remains for some time after leaving the bath. Some of the warm waters at Calistoga are notably possessed of this quality. The cause of this unctuousity has been attributed to the presence of silicates in large proportion, to the monosulphuret of sodium, and to organic matter. Some writers suppose it arises from a combination between the acid secretions of the skin and the bases of the water, forming a kind of soap.

Microscopic examination.—In the physical examination of water, it has been seen that color, taste, odor, and touch, are points of some importance; and as these frequently seem to depend on the germination of organic matter, the presence of certain compounds of iron and other ingredients, the microscope may aid in the detection. This means, however, is generally resorted to for the examination of potable rather than for mineral water. In having recourse to the microscope, the water should be allowed to stand twenty-four hours, and then a drop of the sediment may be examined. The chief appearances are: sand, easily known by its angles, and its being unaffected by any reagent; clay and marl, amorphous non-angular particles, not acted on by reagents; chalk, round and slightly angular particles, at once dissolved by acids. If the water is very impure, evidence of animal or vegetable life, or their *debris*, will be detected under the form of parts of their several structures, and different species of infusoria, etc., (paramecia, diatomaca, entomostraca, etc.) may be seen. If, under these circumstances, no evidence is furnished, the water in a flask, having the neck plugged with cotton wool, to exclude atmospheric contamination, should be freely exposed to light for a day or two, for the development of all possible germs. These will be detected by the microscope, or green (confervoid) matter show itself in quantity proportional to the impurity. This mode of investigation is of the highest value for sanitary purposes; for by it we are enabled readily to ascertain whether active matter is present, on which, in a great measure, the injurious or harmless character of the impurity in water depends.

Chemical examination.—The information then that is gained by the mere physical examination of water, is, alone, neither of a very exact nor accurate character; yet it is most essential that we should be in possession of means to enable us to judge of the applicability of mineral waters to the treatment of disease. Such means are well known to chemists, and the estimation of the exact qualities and quantities of the constituents is a difficult problem of science, which can only be undertaken by the experienced analyst. All mineral waters, therefore, before being recommended therapeutically, should be submitted to chemical examination; for if we are ever thoroughly to comprehend their action in disease, the discovery lies in this direction. Some writers on mineral

waters almost entirely ignore their chemical constituents, finding in the fact that, when analyzed, we cannot explain all their effects. Fortunately, those who would thus place a seal on investigation are but a small minority. Although it will readily be conceded that an analysis, however accurate, in the present state of science, will not always indicate the diseases to which the water is applicable, still, in the majority of instances, it forms an exceedingly valuable guide—one which cannot be overlooked.

"It is nevertheless true," says Dr. Walton, from whose work we have freely drawn, "that the combinations of the elements, as shown in analyses, are altogether empirical. The chemist first determines the bases—the amount of magnesia, soda, potassa, lime, alumina; then the acids and gases—the carbonic acid, sulphuric acid, silicic acid, chlorine, iodine; and after each of these elements is separated, he combines them according to approved formulæ, giving the result in so many grains of carbonate of magnesia, sulphate of potassa, chloride of sodium, iodide of sodium, etc. Yet although the chemist may have performed his work most faithfully, still there are unknown quantities that elude his search, appearing in the analysis under the designations loss, organic matter, or extractive matter. These facts, however, only show that chemical science is not perfect."

I will now proceed, from north to south, to give a special description of each particular mineral spring of which we have obtained any accurate knowledge, detailing all the principal facts respecting location, access, and medicinal properties; also the analyses made by chemists, and others of established reputation, and which are probably not far from being correct.

CASTLE ROCK SODA SPRINGS.

Location.—Near the boundary line between Siskiyou and Shasta Counties; about three hundred miles from Sacramento. The Castle Range, which terminates on the Sacramento River in a conspicuous peak called Castle Rock, is a spur of the Trinity Mountains, running nearly east from the main range. In the valley, on the north side of this range, there are two groups of mineral springs, one of which is on the east side of the Sacramento, nearly opposite the mouth of Castle Creek; the other is three and a half miles further up, and eight miles from Strawberry Flat, at the base of Mount Shasta. The first is called "Lower Soda," and the other "Soda Springs." The latter are in the cañon of the Sacramento, at an elevation of two thousand three hundred and sixty-three feet. Latitude, forty-one degrees and ten minutes.

Access.—From Strawberry Flat to Soda Springs the distance is eight miles. Lava covers the surface, forming a gradual slope, heavily timbered.

Analysis.—The water is a chalybeate, there being an extensive ferruginous deposit around the spring; it is also highly impregnated with carbonic acid, sparkling like soda water, whence the name, which is one usually given in California to springs giving off carbonic acid, and not to those containing carbonate of soda. The temperature of the water was fifty-two degrees, in September, eighteen hundred and sixty-two. The waters have not been quantitatively analyzed.

Properties.—These waters have a high reputation for their tonic effect, and are reported to have a specific action on the kidneys.

Remarks.—From a hill a little to the east of the road, about two miles south of the lower Soda Springs, one of the finest views of Mount Shasta may be obtained. The time will undoubtedly come, when the travel to this beautiful spot will be sufficient to justify more ample preparations than have yet been made to accommodate, at Strawberry Flat, those who seek to climb Mount Shasta. To one possessed of sound lungs and accustomed to mountain traveling, there is no difficulty in the ascent, which can be made in eight hours, except such as arises from the system having to adapt itself so suddenly to the rarified condition of the air at an elevation of over fourteen thousand feet.

TUSCAN OR LICK SPRINGS.

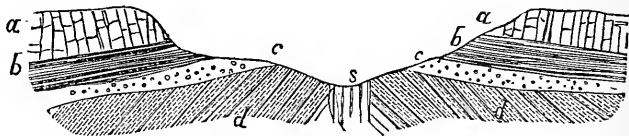
Location.—Tehama County, nine miles from Red Bluff, which is one hundred and forty-five miles, *legal distance*, from Sacramento; latitude, $40^{\circ} 12'$.

Access.—The springs are situated in the crater of an extinct volcano, in the foothills of the Sierra Nevada, and are easy of access by visitors. Altitude, six hundred and seventeen feet.

Analysis.—The waters of these springs are all thermals, the temperature being 76° . They contain common salt, carbonate of soda, salts of lime, a trace of iron, and evolve some sulphuretted hydrogen and a large quantity of carburetted hydrogen, which is collected, partly purified, and burned for heating the waters under the steam baths. No quantitative analysis has been made. The microscope reveals diatomaceæ in large numbers, with considerable vegetable and animal life of the most minute forms. The vegetable organizations are principally oscillatoriæ.

Properties.—The waters of these springs, of which there are several, have much repute in the treatment of intractable rheumatism, and in syphilitic and cutaneous affections. Doubtless much of their virtue may be due to the uniform temperature of the baths for which they are used.

Remarks.—Tuscan, formerly called Lick, Springs, afford, as has already been remarked, an example of ascending springs, the water issuing from an interval between strata that have been upheaved by volcanic action. The annexed section will serve to give an idea of the position of the strata on either side of the springs.



SECTION AT TUSCAN SPRINGS.

a a. basaltic lava; *b b.* volcanic ash and scoriæ; *c c.* conglomerate; *d d.* cretaceous sandstone; *s.* springs.

According to Professor Whitney, from whose geological report this diagram is taken, the cretaceous strata have been bent up into a rather sharp arch, or anticlinal fold, and the volcanic rocks have been denuded in the cañon, so as to expose the sedimentary beds over an area of about one half a mile from northwest to southeast, and a mile in the

opposite direction. The springs are nearly in the centre of this area, the strata dipping away from them, in every direction, at an angle of from 35° to 45° .

At the springs the strata are much bent and twisted, and the cracks, which have been formed while these disturbances were going on, have become filled with carbonate of lime.

One of these springs, at intervals of about one lunation, as I am credibly informed, changes its color from a greenish to a milk-white color. This is probably due to an intermittent spring, which communicates with this subterraneously, impregnating the water with carbonate of lime, and slightly changing it to a sweetish taste.

SUMMIT VALLEY SODA SPRINGS.

Location.—In a valley at the base of the surrounding Sierras, twelve miles from the Summit, where it is crossed by the railroad, and about ninety miles from Sacramento. Latitude, $39^{\circ} 11'$; altitude, six thousand and nine feet, and one thousand feet below the Summit.

Access.—The Central Pacific Railroad stops daily at Summit Valley Station, where there is a good hotel, and whence conveyances can readily be had to the springs.

Analysis.—It is stated that the waters contain a larger amount of carbonic acid than is shown by the following results from a wine gallon, and which escaped in the bottling and transportation:

	Grains.
Carbonic acid, 186.35 cubic inches.....	.....
Bicarbonate of lime.....	43.20
Carbonate of magnesia.....	4.20
Carbonate of soda.....	9.50
Chloride of sodium.....	26.22
Oxide of iron.....	1.75
Silica.....	2.06
Alumina.....	1.75
Potassa—trace.....	.....
Total.....	88.68

Properties.—Dr. Hatch, who gives the above analysis, says: "This might, according to the arrangement of some authorities, be called an 'earthy-saline' water, although the large amount of carbonic acid it contains allies it to the *carbonated* waters. It should, therefore, if we can judge from its constituents and their known properties, possess in a high degree the remedial virtues which are supposed to pertain to these classes. Thus the carbonic acid should give it a place in torpid digestion and certain dyspeptic troubles, while the association of its gaseous element with the alkalies and earths, with chloride of sodium and iron, should make it efficacious in diseases due to a scrofulous diathesis, in rachitis, in chronic affections of the mucous membranes, especially of the intestinal canal, in rheumatism, and in cases requiring its diuretic action. In fact, in some of these, more particularly in chronic catarrhal disorders and in rheumatism, it has been used with marked benefit. Probably, also, taken in connection with the climate of the locality, its

elevation, its invigorating influence, it would prove effectual as a tonic and restorative in some nervous disorders, in anæmia and chlorosis, in atony of the mucous membranes, in debility, and in convalescence from acute disease."

Remarks.—Although I am not able to give the exact temperature of the water, still it may be classed among cold springs, as its taste is most agreeable. The springs adjoin the head waters and snowy waterfalls of the North Fork of the American River, in one of the most wild and beautiful locations in the whole Sierra Nevada range. Everywhere there is grandeur of mountains and forests, and beauty and variety of river foliage, and flowers. The bracing air and exhilarating scenery, which may here be enjoyed, are remarkably efficacious in promoting recovery from debilitating diseases; and I regard the springs, with their surroundings, as perfect sanatoria, from some experience of their powers in restoring health to dyspeptic and cachetic patients, whom I have urged to try them for some weeks. We know that the breathing capacity of those dwelling at great altitudes—for instance, the Swiss Mountains—is most enormous, and this may account for the preventive power of such residence over consumption. Greater efforts are required to inhale enough oxygen in such a rare atmosphere; the chest becomes enlarged and the lungs expanded—even the upper parts of them, which are especially prone to tubercular disease from being disused, now dilating. Hence, circulation, and all the nutritive functions to which it ministers, become more active. Long continued residence at great heights is, however, said to be injurious to those born in lower regions. Thus the Monks of St. Bernard cannot remain at their hospice, which is seven thousand six hundred and sixty-eight feet above sea level, for more than a few years.

LAKE TAHOE HOT SPRINGS.

Location.—On the borders of Lake Tahoe. The lake is on the eastern boundary of California, and lies partly in Placer and partly in El Dorado County.

Access.—The Central Pacific Railroad stops daily at Truckee, one hundred and twenty miles from Sacramento, where conveyances can be had to all points of the lake (which is about fourteen miles distant), at the Tahoe House. A steamer is plying constantly between this place to the springs and to Glenbrook House opposite.

Analysis.—None has yet been made of these waters. They are, however, of the sulphur class, and range in temperature from ninety-eight to one hundred and sixteen degrees, Fahrenheit.

Properties.—They have acquired considerable reputation for the treatment of rheumatism, cutaneous diseases, contractions of joints, syphilis, etc.

Remarks.—There are numerous other mineral springs in this section of the Sierras, and also mountain lakes, but as their waters have not been analyzed, it is unnecessary now to mention them. Lake Bigler, however, now called Lake Tahoe, cannot be passed by without remark, for a

geological interest is fastened upon it. (1) There we see what so many other of the great valleys of the Sierra Nevadas once were.

Situated in a valley at the eastern base of the central ridge of the Sierra Nevada, and at an elevation of some six thousand feet above the level of the sea, it is surrounded by mountains, which rise from one to three, and perhaps, in some cases, four thousand feet above the surface of its water. These mountains are principally composed of friable white granite, water-worn to that degree, that, although they are rough and often covered with rocks and boulders, yet show no cliffs nor precipices.

Their bases of granite-sand rise in majestic curves from the plain of the valley to their steeper flanks. Many of the smaller hills are but high heaps of boulders; the stony skeletons decaying *in situ* half buried in their granite *debris*. The dimensions of the lake—according to Goddard, who explored its southern shores during the State Wagon Road

(1) Since the above was written, and while our report is being printed, we are pleased to learn another fact, which adds to the interest of this locality, and it is that steps have already been taken by Mr. James Lick, of San Francisco, to build and equip a complete observatory in this region. Observations, conducted by Professor George Davidson, of the United States Coast Survey, at Summit Station, on the line of the Central Pacific Railroad, which is about seven thousand two hundred feet above the sea, prove it to be an excellent place for astronomical observations. Such is the transparency of our elevated mountain atmosphere, that peaks, one hundred and fifty miles distant, may be seen as clearly as objects seen ordinarily fifty miles distant; and, what is still more important for astronomical purposes, no clouds disturb the serenity of the firmament, and no changes of temperature, sufficient to distract the emanations of the stars, occur for at least six months in the year. Let us then hope that, as a public benefactor has been found to establish an observatory in a far more propitious locality than the south of Africa, so another Herschel may rise up among us, here to immortalize his own name and add to the scientific glory of California.

The meteorological observations kept at Summit from December seventh, eighteen hundred and sixty-six, to the end of November, eighteen hundred and sixty-seven, show the following results:

MONTHS.		
	Clear days and nights.	Cloudy days and nights.
December, 1866.....	6	19
January, 1867.....	19	12
February, 1867.....	13	15
March, 1867.....	21	10
April, 1867.....	23	7
May, 1867.....	29	2
June, 1867.....	30	.....
July, 1867.....	31	.....
August, 1867.....	30	1
September, 1867.....	27	4
October, 1867.....	27	4
November, 1867.....	15	15
358 days.....	270	88

In February, one storm lasted thirteen days, and ten feet of snow fell. The total snow fall for the year was forty-five feet, and during February, March, and April, the average depth was about thirteen feet. The hills were free from snow about May first, but ten feet lay in some of the valleys. Weather frosty early in May, but flowers were in bloom in June. The winds were mostly east and west, the latter largely predominating. The greatest range of barometer was one inch during the year. Weather in Summer is very pleasant and nights cool. The clear cool nights of Winter were reported as marvelously clear.

and Boundary Survey of eighteen hundred and fifty-five, and determined its extreme southern latitude at $38^{\circ} 57'$, and of whose description we here avail ourselves—can hardly exceed twenty miles in length by ten in breadth.

The shores, at least of its southern coast, are entirely formed of granite-sand, while a dense pine forest extends from the water's edge to the summits of the surrounding mountains, except in some points, where a peak of more than ordinary elevation rears its bald head above the waving forest. An extensive swampy flat lies on its southern shore, through which the upper Truckee slowly meanders, gathering up in its tortuous course all the streams which flow from the south or southeast. This little stream, though but of yesterday, geologically speaking, has yet carried down its sandy deposits through ages sufficient to form the five miles of valley flats, from the foot of the Johnson Pass to the present margin of the lake, and still the work progresses. The shallows at the mouth of the river are stretching across towards the first point on the eastern slope of the lake, and at the same time the water level of the lake is evidently subsiding.

The deep blue color of the water, which is almost perfectly pure, ⁽¹⁾ indicates considerable depth. It is well stocked with salmon, trout, and other fresh water fish. A well ordered sanitarium on the shores of this lake, with all the improved adaptations and appliances which modern hygienic science exacts, would prove a marvellous boon to both patients and doctors, especially during the Summer months.

The following means of the thermometer for the coldest and hottest months at different altitudes, kindly furnished by Col. Williamson, U. S.

(1) ANALYSIS OF THE WATER OF LAKE TAHOE.

To Col. Von Schmidt we are indebted for the following copy of a letter from Prof. Whitney, showing the purity of the water of Lake Tahoe:

CAMBRIDGE, (Mass.,) September 16th, 1871.

MY DEAR SIR: Mr. Hanks determined, under my direction, the amount of solid matter in a gallon of Tahoe water. This is the important element in estimating the value of water, and the only one of much consequence for ordinary water.

The Tahoe water contains exactly three grains of solid matter to the gallon.

Below is a comparative table of the analyses of different waters used for the principal cities in the east:

	Grains.
Lake Cochituate, Boston.....	3.37
Mill River, New Haven.....	4.00
Jamaica Pond, Brookline and Boston.....	4.40
Lake Ontario, Rochester.....	4.16
Hudson River, Albany.....	7.24
Schuylkill River, Philadelphia.....	5.50
Detroit River, Detroit.....	5.72
Ohio River, Cincinnati.....	6.74
Lake Michigan Chicago.....	8.01
Croton River, New York City.....	10.60

The result indicates that the Tahoe water is purer than any used for distribution to cities anywhere in the United States.

I have an impression that the purest water ever analyzed in New England was that of the Pawtuxet River, in R. I., which gave about two and one half grains to the gallon, but I cannot now find the document. Will hunt it up.

Yours truly,

J. D. WHITNEY.

A., and the Engineer Department of the Central Pacific Railroad, afford some positive knowledge of the climate of the Sierras :

Stations.	Altitude.	Latitude.	July.	Jan'y	Range.	Authorities.
Aurora.....	7,468 ft.	38° 12'	68°	26°	42°	Col. Williamson.
Hope Valley.....	7,088 ft.	.....	55°	26°	29°	Col. Williamson.
Summit.....	7,200 ft.	39° 11'	77° Aug.	28°	49°	Central Pacific Railroad.
Truckee.....	5,866 ft.	39° 12'	53°	23°	30°	Central Pacific Railroad.
Strawberry Valley	5,710 ft.	.....	60°	36°	24°	Col. Williamson.
Fort Jones..... }	2,578 ft.	41° 36'	71°	31°	40°	Army Meteorological Register.

Aurora, the southernmost of these stations, is situated upon a beautiful flat formed by the conjunction of two ravines, which come down from between Silver, Middle, and Last Chance hills. Fort Jones, the northernmost station, lies in Scott's Valley, on a small tributary of the Klamath River, nearly one hundred miles from the head of the Sacramento Valley, and an equal distance in a direct line from the Pacific coast.

In the arctic regions, including Greenland, Iceland, and Alaska, consumption is very rare; so much so, that some writers even deny its presence altogether in the extreme North. It is also almost as well established, for reasons given a few pages previously, that this disease is equally as rare at great altitudes, where it is dry, even although it be very cold. Thus the curative influence of the climate of the valleys of the Peruvian Andes has been well proved in the military hospital established in the Valley of Junja, upwards of ten thousand feet above the level of the sea. The climate of our mountain regions having been shown, in respect of temperature, to be peculiarly favorable for physical comfort, especially during the Summer season, when the atmosphere is dry and invigorating, we may confidently hope for benefit to those predisposed to, or already presenting the early signs of consumption, by resorting to our mountain watering places, where the additional good effects of judiciously employed and properly selected waters may be derived.

CALIFORNIA SELTZER SPRINGS.

Location.—In the Coast Mountains, in Mendocino County, near the post town Sanel.

Access.—From San Francisco via steamer to Donahue, thence by California and Northern Pacific Railroad to Sanel.

Analysis.—According to F. A. Bauer, one pint contains:

	Grains.
Carbonate of soda	4.61
Carbonate of magnesia.....	5.65
Carbonate of lime.....	8.80
Carbonate of iron.....	trace.
Chloride of sodium.....	2.15
Silicic acid.....	trace.
Total solids.....	21.21
* Gas—Carbonic acid, abundant (1871).	

Properties.—According to the analysis, this is a very fine alkaline water, and we should expect it to act favorably in cases of dyspepsia and diseases of the liver and bladder, in which alkaline waters are indicated.

Remarks.—There are a great many other springs in Mendocino County, which remain to be properly investigated. Near Ukiah is one said to be peculiarly efficacious in skin diseases and rheumatic complications, and to have materially benefited several cases of asthma. On the head waters of Big River, fifteen miles from Ukiah, are several hot sulphur springs. At either end of Potter Valley, are soda and sulphur springs, each possessing their properties.

Mendocino County offers peculiar inducements to tourists and pleasure seekers. The Eel River section is one of the many fine fishing and hunting grounds to be found in this region of the State. The scenery of this county is unrivaled for beauty and grandeur, and especially is this true of the coast region.

HIGHLAND MINERAL SPRINGS.

(Formerly Caldwell's, now Shartzer's.)

Location.—Napa County, seven miles from Lakeport, and four miles from Kelseyville.

Access.—Daily communication from San Francisco, via Cloverdale or Calistoga routes.

Analysis.—An incomplete examination of these waters show them to be impregnated with sulphate and carbonate of magnesia, chloride of sodium, manganese, potassium, silica, and calcium; also, a trace of sulphur. They are, likewise, highly charged with carbonic acid gas.

Properties.—These springs have been known for several years as a resort for invalids afflicted with rheumatism and various chronic diseases. The baths are very invigorating, the water from some of the springs being warm enough just as it flows from the springs.

Remarks.—Menefee, to whose interesting "Sketch Book" I am indebted for much information respecting the springs of this region, says that the waters of this, as well as of Seigler's Springs, about six miles westerly from Lower Lake, "have effected many remarkable cures," and that these springs have been known for several years as a neighborhood resort for invalids.

HOT BORATE SPRINGS, BORAX LAKE.

Location.—Lake County; has the most natural boundaries of any other one in the State. The whole of it lies between two main branches of the Coast Range Mountains. Both these ranges are formed of narrow ridges of broken mountains, and from the beauty and grandeur of the scenery this region has been justly named the Switzerland of America. Lying about the center of this county is Clear Lake, at an elevation of about one thousand five hundred feet above the level of the sea, and thirty-five miles distant from the Pacific Ocean. A short distance east of the narrow arm of this lake, and separated from it by a low ridge, is Borax Lake. About a mile beyond the ridge bordering Borax Lake, are the sulphur banks, a feature of great interest, as showing the geological formation of this region, where solfatara is still going on. The

banks cover an area of about forty thousand square yards, and from beneath them appear to flow the hot borate springs.

Access.—The springs are in the neighborhood of Lower Lake, the principal town in the county and neighborhood, and are reached from San Francisco, one hundred and four miles distant, via the Napa Valley Railroad, and stage from Calistoga, thirty miles distant.

Analysis yields the following results in each gallon of water:

	Grains.
Chloride of potassium.....	trace.
Chloride of sodium.....	84.62
Iodide of magnesium.....	.09
Bromide of magnesium.....	trace.
Bicarbonate of soda.....	76.96
Bicarbonate of ammonia.....	107.76
Biborate of soda.....	103.29
Sulphate of lime.....	trace.
Alumina.....	1.26
Carbonic acid (free).....	36.37
Silicic acid.....	8.23
Matters volatile at a red heat.....	65.77
Total.....	484.35

Properties.—Borate of soda, or borax, one of the principal constituents of the waters in this locality, is an alkaline salt, used externally as a cosmetic, and internally as a mild refrigerant and diuretic. It is also valuable in certain obstructions of the female functions, but must be used with care for such purpose. It is also one of the best remedies that can be used in nephritic and calculous complaints dependent on an excess of uric acid. These springs must, therefore, prove beneficial in the class of disorders just mentioned, and also become valuable adjuncts when used as baths in certain scaly, cutaneous eruptions.

Remarks.—Our State Geologist, referring to the above analysis, says: "In this table, the constituents are necessarily calculated as anhydrous salts; the biborate of soda, however, contains about forty-seven per cent of water when crystalized, and the 103.29 grains given above correspond to 195.35 of crystalized borax. The most extraordinary feature in the above analysis is the very large amount of ammoniacal salts shown to be present in this water, in this respect exceeding any natural spring water which has ever been analyzed. Mr. Moore (who made the analysis) thinks that, as in the case of the boracic acid waters of Tuscany, this ammoniacal salt may be separated and made available for economical purposes." One of the most wonderful features connected with the sulphur banks is a large spring, boiling and bubbling up as a mighty cauldron, but which, in the immediate vicinity of the banks and the hot borate springs, is almost as cold as ice.

ADAM'S SPRINGS.

Location.—In the mountains of Lake County, about eight miles south of Clear Lake, and four miles from Cobb Valley, between the Geysers and Seigler's.

Access.—From Calistoga or Lower Lake.

Analysis.—Each gallon of water contains the following:

	Grains.
Carbonate of lime.....	28.714
Carbonate of magnesia.....	99.022
Carbonate of soda.....	57.036
Carbonate of iron.....	.517
Chloride of sodium.....	4.112
Silica.....	7.218
Organic matter.....	2.811
Salt of potash—traces.....	.....
Nitric acid—traces.....	.....
Total.....	199.430

Each gallon also contains three hundred and four cubic inches of free carbonic acid gas. Dr. Hatch, who gives the above analysis, says the water of this spring has afforded marked relief in rheumatism, and is much esteemed by those who have used it for the correction of certain diseases of the stomach associated with deficient secretion of bile. It is also thought by many who have visited it to be useful in certain diseases of the female organs.

HARBIN SPRINGS.

Location.—Four miles west of Middletown, which is on the main county road to Clear Lake and Lakeport, and twenty miles north of Calistoga, in a wild and picturesque cañon of the Coast Range Mountains.

Access.—A regular line of stages runs between Calistoga and these springs.

Analysis.—The main spring discharges about four hundred and fifty gallons of water per hour. Its temperature ranges from 118 to 120°. It is highly charged with sulphur, soda, iron, and magnesia—the sulphur predominating. Another of the numerous springs has a temperature of 108°, and contains more iron and less sulphur. The waters have not been quantitatively analysed.

Properties.—These, like all thermal springs, are employed chiefly for baths, and, for this purpose, thirteen bath-rooms are here constructed—two of which are plunge baths. The water feels as soft and agreeable to the skin as if it were oil. It stimulates the skin and digestive organs, and soothes the nervous system.

Remarks.—In addition to the mineral waters, there are several springs of pure, potable water, which is cold at all seasons.

BARTLETT SPRINGS.

Situation.—East of Clear Lake, and about twenty-five miles from Lower Lake, in Lake County.

Access.—The same as the hot borate springs, just described.

Analysis.—Only a partial analysis of the waters have been made. They are known to contain sulphur, magnesia, manganese, potassium, and calcium.

Remarks.—There are other springs in the same locality—one, almost ice cold, and highly charged with carbonic acid; also, about one and a half miles westerly, is one called the Soap Spring. It is about twenty-five feet long, twelve feet wide, and six feet deep, with a natural wall of boulders on all sides of it, forming a splendid plunge or swimming bath. Its waters contain borax, soda, salt, and sulphur. It is tepid, and of a very pleasant temperature for bathing. A few feet from it is another spring, containing iron, soda, and chloride of sodium; temperature, 85°. One and a quarter miles in a northerly direction from the Bartlett is a very remarkable spring, known as the Gas Spring. The strong gas issuing from it is the same as met with at the Sulphur Banks, above described. No water flows from it, and the quantity of water never increases or diminishes, but it is continuously in motion, as if it were boiling. The sound, as of escaping steam, may be heard for a considerable distance from the spring. The water is intensely cold.

THE GEYSERS.

Location.—There are two localities of hot springs, the Geysers and the Little Geysers—both situated in a deep gorge in Sonoma County, known as Pluton Cañon, though really one main branch of Sulphur Creek, that empties into Russian River near Cloverdale. The Geysers are about seventeen thousand feet above the sea, and are surrounded by lofty and rugged mountains. Along the cañon, for a distance of a quarter of a mile or more, and covering an area of several acres, numerous hot springs and steam, to the number of at least three hundred, occur. The temperature of the waters vary from 200° to 210° Fahrenheit. About four miles up Pluton Cañon, are the Little Geysers. They consist of a number of hot springs along a hillside. Many of the effects seen at the Geysers may here be witnessed; but the water is comparatively pure, and stands at a temperature of 190° to 200°. Some low forms of growth, such as algæ and confervæ, grow on the surface of the water.

Access.—There are two roads leading to the Geysers; one from Healdsburg, by way of Foss Station and the Hog's Back, called the old road; the other, from Calistoga, Napa County, by way of Knight's Valley, known as the new road. The scenery from the road from Foss Station up the mountains is gorgeous and picturesque. Pines, oaks, madronas, and other trees, shade the road, while there is a thick undergrowth of buckeye, manzanita, and other brush. The road winds around mountains and deep cañons, till the highest point, called the Summit, is reached, three thousand two hundred feet above the sea. Before reaching the Summit, the road winds around Sulphur Peak, which is, next to Mt. St. Helena, the highest peak in this part of the Coast Range. It is one of the stations of the primary triangulation of the Coast Survey, and affords a view of great extent and beauty.

Analysis.—The waters hold in solution a great variety of salts. The sulphates of iron, lime, and magnesia, predominate. Sulphate of magnesia, tartaric acid, alum, magnesia, and sulphur, are found in great quantities. These salts give the rocks a peculiarly vivid coloration.

Properties.—All thermal springs of the sulphur class are of decided efficacy in rheumatism and diseases of the skin, and these waters are of much service in the treatment of such diseases. Doubtless the alum springs of this locality are beneficial in atomic diseases, attended with profuse discharges and hemorrhages. The steam or vapor baths, which

have been constructed by building sheds over some of the springs, may be made available as adjurants. The principal steam bath is in the bottom of Pluton Cañon, near a fresh water brook; so that after the warm douche and the vapor bath, the bather goes a few steps, and finds a plunge bath of the most sparkling mountain water in an artificial reservoir, so arranged that the contents are constantly renewed.

Remarks.—The name was given to these springs from their supposed resemblance to the Geysers of Iceland, though it would require a very vivid imagination to see any marked resemblance. The Geyser Cañon is half a mile long; the bottom, from one or two rods in width, and the banks shoot up one thousand four hundred feet at an angle of 45°. Here and there, at wide intervals, are small jets of steam from springs, which are bubbling and hissing in all directions. One spring, called the "Devil's Inkstand," contains dark precipitate of sulphuret of iron, that is used to write the registries at the hotel. From one of the large vents in the ground, which is about two feet in diameter, the steam escapes with a loud noise—not unlike that from the escape pipe from an engine—and hence is called the Steamboat Geyser. The steam rises several hundred feet, and is ejected in regular pulsations, as by an engine at work. On the same side of this ravine is the "Witches Cauldron," an unfathomable pool, near seven feet in diameter, filled with a blackish, viscid fluid; of 200° temperature; is continually boiling, and sending forth mephitic vapors. Twelve feet away is the "Intermittent Scalding Spring," which sends forth jets of water of a temperature of 175°. They sometimes rise to a height of fifteen feet, but the pressure varies at different times. It is the same with nearly all the springs. At no time, however, do the jets cease entirely. As the degree of pressure, and the height to which the water is thrown, vary, so does the sound. There are other wonderful phenomena here of which it would be out of place, in a report of this character, to enter upon a full description. To give some idea of these wonders, we can only here state that there are springs only a few feet apart, one cold and the other burning hot—springs issuing, apparently, from the same orifice, of waters of different color, smell, taste, and chemical composition. "Here," in the descriptive language of T. Starr King, "we would turn up a patch of brown, crumbly soil, and find a clay that looks like blue vitriol; near by, under a shelving ledge, is a brisk, bubbling pool, overhung with verdigris encrustings; a few feet off, spurts a beaded jet of hot water, which sheds a dismal brown casting over the surrounding earth; a little way further still, is a spring that looks like pure, hot ink; then we discover a rock of alum that weighs two or three hundred pounds; then a small fountain of epsom salts; not far off, again, a basin of apparently boiling soap-suds; then iron springs, soda springs, white, red, and black sulphur springs; and soon a foul stygian sluice, close to the wall, from which a steam exhales to cover the overhanging earth with slimy deposit, which eats your clothes, if you touch it, as ravenously as aqua fortis." With this general idea of the wonderful phenomena exhibited in this locality, we must close our remarks, recommending it to the seeker after health and pleasure, as well as the searcher into the mysteries of creation. It is said that since the discovery of the Geysers, in eighteen hundred and forty-seven, the hot water and acids have decomposed some of the surroundings and rocks, and that the ground is gradually sinking. Near the "Geysers" are the somewhat celebrated "Indian Springs," supplied by three streams—sulphurous, chalybeate, and aluminate. They have been successfully employed in many instances in the form of baths.

Also, near the "Geysers" only four or five miles distant, may be found what are called the "Blue Lick" Springs—hot and cold—so named from their remarkable resemblance to the spring of the same name in Kentucky.

ZEM-ZEM SPRINGS.

Location.—In the northern part of Napa County, on Etiquary Creek, forty miles from Napa City.

Access.—By the direct road to Clear Lake, via Berryessa Valley.

Analysis.—S. Jeff Owens & Sons, the proprietors, furnish the following analysis, which they state was made by Dr. Boon, of Seigler Springs:

Sulphur	50 parts in 1,000
Iron.....	27 parts in 1,000
Magnesia.....	28 parts in 1,000
Solid matter.....	105 parts in 1,000

Properties.—The water is cold and very palatable; temperature, 64°, and doubtless will be found beneficial in certain affections of the kidneys and liver, as well as in rheumatism, for which they have attained some notoriety. The name, which may be found in Webster, means "holy well in Mecca."

ST. HELENA—WHITE SULPHUR SPRINGS.

Location.—These springs are situated in a deep, romantic cañon, in Napa County, about two miles west from the town of St. Helena, and eighteen miles northwest of Napa City.

Access.—The Napa and Vallejo Railroad lands passengers at Calistoga, whence conveyances can be had at all times.

Properties.—There are nine springs possessing substantially the same medicinal properties, varying only in temperature and in the relative proportion of their solid constituents. Of three of these a quantitative analysis has been made by Professor LeCompte, the result being the following, in a wine gallon:

Analysis of St. Helena, White Sulphur Springs.

	QUANTITATIVE ANALYSIS.			QUALITATIVE ANALYSIS.					
	No. 2.	No. 6.	No. 7.	No. 1.	No. 3.	No. 4.	No. 5.	No. 8.	No. 9.
Temperature of spring, August, 1871.	89.6 F. 1.00026	86.0 F. 1.00040	69.8 F. 1.00038	97.25 1.00010	79.7 1.00012	75.2 1.00023	76.4 1.00038	64.4 1.00018	68 1.00023
<i>Solids.</i>									
Carbonate of lime.....	Grains. 1.25	Grains. 2.44	Grains. 5.56	.....	.....	.....	.....	.....	.....
Carbonate of magnesia.....	0.62	0.56	4.36	.....	.....	.....	.....	.....	.....
Sulphate of soda.....	8.26	11.33	12.84	.....	.....	.....	.....	.....	.....
Chloride of sodium.....	21.72	23.41	14.23	.....	.....	.....	.....	.....	.....
Chloride of calcium.....	1.32	0.86	0.78	.....	.....	.....	.....	.....	.....
Chloride of magnesium.....	0.87	2.22	0.65	.....	.....	.....	.....	.....	.....
Sulphides sodium and calcium.....	2.65	1.85	1.62	.....	.....	.....	.....	.....	.....
Totals.....	36.69	42.67	40.04						
<i>Gases.</i>									
Sulphuretted hydrogen.....	Cu. inch. 6.15	Cu. inch. 4.25	Cu. inch Trace.	.....	Trace.	.....	.....	Trace.	Trace.

Remarks.—The other springs, of which only a qualitative analysis has been made, Dr. Hatch observes, possess the same ingredients. The waters are used both internally and for bathing.

"These springs belong properly to what are called the 'light sulphur' waters. Taking into consideration their temperature, more especially that of Number One, which is used principally for bathing purposes, and which is thought to contain a greater proportion of sulphuretted hydrogen than the others, we can imagine them useful for the general purposes to which this class of waters are adapted. At the present time, and under present management, the place is kept rather as a pleasant, healthful, and fashionable resort for the wealthy citizens of the metropolis and other cities, than as a sanitary retreat. For the former it is delightfully adapted—for the latter it might be profitably employed."

CALISTOGA HOT SPRINGS.

Location.—The little Town of Calistoga, located at the terminus of the Napa branch of the Pacific Railroad, has become famous on account of its numerous mineral waters. The springs are situated in the level valley, five hundred feet above the sea, and surrounded, except on the south side, by high and picturesque mountains.

Access.—From San Francisco via steamboat to Vallejo, and thence by railroad, three and a half hours. From Sacramento, by rail, direct to Vallejo, thence, as above, and in about the same time.

Analysis.—The principal springs are sulphurous and thermal. The temperature of the one which has been analyzed by Dr. Hatch, is 97°, and yields the following result in each gallon of water:

	Grains.
Sulphuretted hydrogen gas—3.271 cubic inches.....	.....
Chloride of sodium.....	22.250
Chloride of calcium.....	3.263
Carbonate of soda.....	3.406
Sulph. soda.....	1.616
Sulph. magnesia.....	0.466
Silica.....	6.500
Alumina.....	trace.
Total.....	37.501

Properties.—These waters appear to be similar to those of St. Helena, yet probably lighter, containing less of the sulphuretted hydrogen and of the metallic oxides. They have been used with advantage in the diseases to which this class of waters are suited; especially in rheumatism, paralysis, dartsous diseases of the skin, and as an auxiliary in syphilitic affections.

Remarks.—The springs number about sixty, varying in temperature from lukewarm to boiling hot, and distributed over an area of one hundred acres. The waters are used almost exclusively for bathing, and commodious arrangements have been made for the plunge bath. A hot sulphur steam bath is also constructed, so that the effects of the water in the form of hot vapor may be procured. Here also are found the moor or mineral mud baths, similar to those of Franzensbad and Ma-

rienbad, in Bohemia. Calistoga is one of the outgrowths of our rapid American civilization. The name was framed by uniting the first two syllables of California with the last two of Saratoga; though there is not the least analogy between the two as regards the properties of the water. In this region, the vine flourishes luxuriantly, and grapes of every variety are to be had in abundance. Invalids are thus afforded the opportunity of trying the "grape cure," as practiced at Vevay, in Switzerland.

The following table gives the mean temperature of each month, as taken at the Springs Hotel, and published in Menefee's sketch book, already referred to: ⁽¹⁾

	6 A. M.	12 M.	6 P. M.
January	46°	56°	52°
February	50°	59°	56°
March	56°	60°	56°
April	52°	70°	60°
May	68°	77°	76°
June	68°	90°	68°
July	73°	84°	79°
August	60°	86°	77°
September	55°	82°	68°
October	52°	81°	72°
November	48°	64°	61°
December	46°	57°	56°

SKAGGS' HOT SPRINGS.

Location.—Sonoma County, about twenty miles north from Healdsburg.

Access.—From San Francisco by daily boat to Petaluma; thence by rail to Healdsburg, and thence about twenty miles to Springs. Time, about twelve hours.

Analysis.—There are three springs open at present. That nearest the hotel is impregnated with sulphur, iron, and borax. The temperature varies from 128° to 130°. The second spring, about one hundred yards distant, contains manganese, iron, sulphur, and soda. Temperature, 138° to 140°. To the left, and nearly opposite the spring just described, is the Iron Spring, situated on a knoll.

Remarks.—Besides these springs, there are several others in this county. Dr. Hatch gives the following analysis of one of these, which is called Geyser Spa Spring. The solid contents in one quart of water are reported as follows:

(1) It is respectfully suggested to meteorological amateurs, that they take their observations hereafter at seven A. M., two P. M., and nine P. M., so as to conform with the plan adopted by the Smithsonian Institute, to secure uniformity. The period or length of time observed should also be mentioned. Proper blank forms will be furnished, when applied for, from this office.—[Secretary Cal. St. Bd. Health.

	Grains.
Bicarbonate of soda.....	5.87
Bicarbonate of magnesia	2.45
Carbonate of iron	0.95
Carbonate of lime	1.14
Chloride of sodium	2.49
Sulphate of soda.....	0.85
Silica.....	0.45
Loss.....	0.08
	14.28

The water of this spring, like some other mineral waters, is bottled and sold for ordinary use. It is esteemed by many as an antacid and mild corrective of disordered digestion.

PACIFIC CONGRESS SPRING.

Location.—In the coast mountains, ten miles south west from the Town of Santa Clara.

Access.—From San Francisco, via South Pacific Railroad.

Analysis.—Dr. Hatch gives the following result in each gallon of water:

	Grains.
Chloride of sodium.....	119.159
Sulphate of soda.....	12.140
Carbonate of soda.....	123.351
Carbonate of iron.....	14.030
Carbonate of lime.....	17.295
Silica, alumina, and traces of magnesia.....	49.882
Total.....	335.857
Temperature, 50° Fahrenheit.	

Properties.—The water is laxative in its effects when freely employed, and, besides its use for the general purposes of the waters belonging to this class, it has been found of essential service in habitual constipation. It is decidedly chalybeate, and should be indicated in cases of chlorosis and anæmia, and generally where the tonic influence of iron is required. The carbonate of lime ought to add to its efficacy.

NEW ALMADEN VICHY WATER.

Location.—In the same section of Santa Clara County, and accessible by the same route, but farther south, than the above spring, near the New Almaden Quicksilver Mines.

The analysis reported by Dr. Hatch gives the following result to each quart:

	Grains.
Carbonic acid.....	28.2
Bicarbonate of soda.....	50.3
Bicarbonate of lime.....	8.0
Oxide of iron.....	1.2
Sulphate of lime.....	10.5
Sulphate of magnesia.....	3.0
Chloride of sodium.....	8.4
Solid constituents, with traces of silica.....	108.16

Properties.—It has been much used in old rheumatic and gouty affections, and is of value in debilitated and chlorotic conditions, and in some gastric disorders.

PASO ROBLES HOT SPRINGS.

Location.—San Luis Obispo County, California.

Access.—From San Francisco by steamer, about one hundred and eighty miles south to San Luis Obispo; thence, twenty-seven miles north by stage, to the springs. Or, by San Francisco and Southern Pacific Railroad to Soledad; thence forty miles south by stage to the springs. From Los Angeles, north, by steamer, to San Luis Obispo.

Properties.—From the following analysis it will very readily be seen that this is an exceedingly valuable thermal water, closely allied in chemical composition to the waters of Aix-la-Chapelle, in Rhenish Prussia. There is the unusual combination of thermality, considerable chloride of sodium, sulphuretted hydrogen, carbonic acid gas, and an active amount of alkaline carbonates. A water such as this cannot fail to be a benefit in very many cases of gout, chronic rheumatism, and dartsous skin diseases; also, in contractions of the joints and old gun-shot wounds. In fine, it is applicable to all those diseases especially benefited by a thermal saline-sulphur water. The immediate effect of the water is laxative and diuretic; the remote, alterative.

ANALYSIS.

One pint contains:	Main Spring, 112° Fahr. Prof. Thomas Price.	Mud Spring, 122° Fahr. Prof. Thomas Price.
<i>Solids.</i>	Grains.	Grains.
Carbonate of soda.....	3.664	0.543
Carbonate of magnesia.....	0.057	0.323
Chloride of sodium.....	2.830	10.047
Sulphate of potassa.....	0.092	trace.
Sulphate of soda.....	0.818	4.281
Sulphate of lime.....	0.334	1.864
Protoxide of iron.....	0.037	.....
Iodides and bromides.....	traces.	.....
Alumina.....	0.023	.....
Silica.....	0.046	0.116
Organic matter.....	0.171	0.361
Total.....	8.072	17.535
<i>Gases.</i>	Cubic in.	Cubic in.
Carbonic acid.....	2.31	10.53
Sulphuretted hydrogen.....	saturated.	saturated.

Remarks.—The name Paso de Robles means White Oak Pass, so called from the white oaks grown in the valley. Unfortunately, the immediate surroundings of the springs are not attractive, the valley in which they are situated being flat, and the mountains, on either side, low, and of a monotonous uniformity. But let the visitor go over a few miles to the southern slope of the Santa Lucia Mountains, and his eyes will be sated with color and scenery, more enchanting than can be witnessed outside of California.

The conveniences at these springs are such as accompany the early stage of improvement. There is a good hotel, and two swimming baths—one for gentlemen and one for ladies.

The description of the above springs, as well as that which follows, of Santa Barbara, San Bernardino, and Agua Caliente, is compiled chiefly from the work of Dr. Walton, already referred to.

SANTA BARBARA HOT SULPHUR SPRINGS.

Location.—Santa Barbara County, California.

Access.—From San Francisco, two hundred and eighty miles south, by steamer, to Santa Barbara; thence, four miles by stage; or, by Southern Pacific Railroad, to Soledad; and thence by stage thirty hours to Santa Barbara.

Analysis.—No quantitative analysis has been made. They are hot sulphur waters. Temperature, 60° to 130° Fahrenheit.

Properties.—These waters are valuable in chronic rheumatism, diseases of the skin, contractions of the joints, paralysis, and, as an auxiliary, in the treatment of secondary and tertiary syphilis.

Remarks.—In this connection, I insert a portion of a letter received March twenty-two, eighteen hundred and seventy-two, from Doctor M. H. Biggs, of Santa Barbara:

“The hot sulphur springs of Santa Barbara are situated at the head of a deep cañon, about five miles to the northeast of the Town of Santa Barbara, at an elevation of fourteen hundred and fifty feet above the level of the sea. They number, in all, seven, and seem to be of two distinct varieties. Those nearest the head of the cañon escape from crevices in the rock, and are four in number, all appearing to have the same properties, the most sensible of which are free sulphur and sulphuretted hydrogen; their temperature, 114° Fahrenheit. Another spring is situated about one hundred yards off, in a westerly direction from the first mentioned; temperature, 117° Fahrenheit. Its principal constituent is sulphate of alumina, evident from the thick incrustation of this salt on the under surface of the rock beneath which this water escapes; it also tastes strongly of sulphate of iron, and is said to contain soda and potash, and a trace of arsenic. The two remaining springs are located in a branch cañon, about one hundred rods in a northeasterly direction from the last one mentioned, and appear to possess the same qualities, with the exception of the temperature, which is only 112° Fahrenheit. No thorough analysis of these mineral springs has ever been made, at least in our time.

“It is said that while this country was in possession of the King of Spain, a corps of scientific men was sent out to this coast, commissioned, among other things, to test the properties of the several mineral springs known to abound here; and, that in their report they pronounced the Santa Barbara Hot Sulphur Springs to be the best and most medicinal,

and superior to any other in California 'for the cure of many diseases.' Whether they came to this conclusion from actual analysis, or from simply witnessing their effect, is not known. Certain it is that at the present day they are becoming famous for their curative effects in many cases of rheumatism, paralysis, various diseases of syphilitic origin, and skin diseases generally; and from persistent use of the waters (drinking and bathing) many individuals have been cured of such affections."

The climate of Santa Barbara is delightful. It seems more nearly to resemble that of Monaco and Mentone, on the shores of the Mediterranean, than any other in America. Throughout the year the temperature is mild and equable, affording that opportunity for continual out-door exercise that is so important to consumptives. From a report by me, in my capacity of Permanent Secretary of the State Board of Health, I subjoin the following:

Santa Barbara is the county seat and principal town of the county of the same name. It is built upon a beautiful slope, rising from the sea beach, at the southeastern extremity of a gently ascending valley, some fifteen miles in length and two in width, but gradually spreading out to five miles, as it extends into the interior. The beautiful harbor consists of a cove, or semi-ellipse, about one and a half miles wide from point to point, indented into the curving shore, and protected by the overlapping Santa Ynez and adjoining ranges. The gently-sloping beach for several miles affords safe sea-bathing at all seasons of the year. At low water an admirable and pleasing drive, equal to that of Newport, may here be had, and the interesting drawing of the seine, full of every variety of fishes, may be witnessed—a most important item in the dietary of the feeble, from the warmth-giving phosphorus contained in fish.

As to the climate of Santa Barbara, it will be seen that although lying in about the same latitude as Wilmington, North Carolina, ⁽¹⁾ yet it is totally different, and that the isothermal line would be deflected towards St. Augustine, Florida. Nearly the same clothing is worn all the year round, and there is no day in the year in which the invalid may not sit out of doors. This covers the most essential indication in the treatment of consumption, by affording a continuous supply of pure, unadulterated air-food for the lungs. Still, as the climate possesses some latent peculiarities in its favor, too subtle for ordinary observation, I shall instance the remarkable phenomenon so philosophically noted by Doctor Brinkerhoff, who has resided here eighteen years.

Some ten miles from Santa Barbara, in a westerly direction in the bed of the ocean, but about one and a half mile from the shore, is an immense spring of petroleum, the product of which continually rises to the surface of the water and floats upon it over an area of many miles. This mineral oil may be seen any day from the deck of steamers plying between here and San Francisco, or from the high banks along the shore, its many changing hues dancing upon the shifting waves of the sea, and affording various suggestions, both for the speculative and the speculator. Having read statements that, during the past few years, the authorities of Damascus and other plague-ridden cities of the East, have resorted to the practice of introducing crude petroleum into

(1) An unaccountable error has been running through all the numerous republications of this letter (which originally appeared in the *Rural Press*, in 1871), substituting Charleston, South Carolina, for Wilmington, North Carolina.—[Secretary of the State Board of Health.

the gutters of the streets to disinfect the air, and as a preventive of disease, which practice has been attended with the most favorable results, I throw out the suggestion, but without advancing any theory of my own, whether the prevailing westerly sea breezes, passing over this wide expanse of sea-laden petroleum, may not take up from it and bear along with them to the places whither they go, some subtle power which serves as a disinfecting agent, and which may account for the infrequency of some of the diseases referred to, and probably for the superior healthfulness of the climate of Santa Barbara.'

I would add that, during one week's sojourn here, my attention has been directed to the peculiar ambrosial influence pervading the air, so well described above, and that I indorse all that has been stated in this respect. That the climate of Santa Barbara possesses all the elements of general healthfulness in an eminent degree, is substantiated by the fact that the epidemics incident to childhood are almost unknown. Fever and agues never originate here. Smallpox, frequently brought from abroad, never spreads, although hundreds of the native population, either from ignorance or prejudice, never allow themselves to be vaccinated.

I have said, when speaking of the prolific yield of the soil, that it was due to the moist sea air. On this depends the deliciousness of the climate. Moist air, either too hot or too cold, is injurious. The latter chills the surface and drives the blood in upon the internal organs. But the moist air in which we bathe in Santa Barbara, is possessed of that happy combination of temperature with moisture, which, while it refreshes, also invigorates and vitalizes equally the whole system. The range between the wet and dry bulb thermometers, at two P. M., is usually about four degrees, except on foggy or rainy days, when they are often identical; and yet, strange to say, the feeling of chillness is never experienced. During the prevalence of a high land wind, the range is occasionally extended to ten or even twenty degrees; but even then that feeling of irritation and dryness which attends the same wind in the more northern portions of California, is unknown. This occurrence, however, does not happen oftener than once or twice a year, and then only for a brief period, about the equinoxes.

The peculiar evenness of the climate is shown in the following tables, compiled from the meteorological register of the Rev. J. A. Johnson, the indefatigable editor of the *Santa Barbara Press*:

	Monthly mean.
April, average of the three daily observations	60.62° F.
May, average of the three daily observations	62.35° F.
June, average of the three daily observations	65.14° F.
July, average of the three daily observations	71.49° F.
August, average of the three daily observations	72.12° F.
September, average of the three daily observations	68.08° F.
October, average of the three daily observations	65.96° F.
November, average of the three daily observations	61.22° F.
December, average of the three daily observations	52.12° F.
January, average of the three daily observations	54.51° F.
February, average of the three daily observations	53.35° F.
March, average of the three daily observations	58.12° F.
Average temperature for the year	60.20° F.

Coldest day.		Warmest day.	
April 12th.....	60° F.	April 16th.....	74° F.
May 15th.....	66° F.	May 23d.....	77° F.
June 1st.....	69° F.	June 3d.....	80° F.
July 26th.....	76° F.	July 11th.....	84° F.
August 11th.....	77° F.	August 8th.....	86° F.
September 23d.....	66° F.	September 27th.....	90° F.
October 23d.....	60° F.	October 20th.....	92° F.
November 7th.....	64° F.	November 20th.....	87° F.
December 15th.....	52° F.	December 28th.....	71° F.
January 11th.....	56° F.	January 3d.....	76° F.
February 22d.....	42° F.	February 28th.....	71° F.
March 13th.....	56° F.	March 27th.....	83° F.

Coldest day in the year, February 22d, 42° F.; warmest day in the year, October 20th, 92° F. Variation, 50°.

RANGE OF THE THERMOMETER

At the Morris House, Santa Barbara, California, from July first, eighteen hundred and seventy-two, to June thirtieth, eighteen hundred and seventy-three, from record kept by Dr. L. N. Dimmick.

1872.	JULY.			AUGUST.			SEPTEMBER			OCTOBER.			NOVEMBER			DECEMBER		
	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...
1.....	73	79	60	64	74	60	68	76	65	52	69	53	56	80	57	68	77	55
2.....	77	75	61	65	78	63	64	70	65	61	69	58	58	70	55	52	65	52
3.....	67	76	60	64	80	62	64	75	62	61	69	57	59	62	51	57	63	50
4.....	62	76	62	65	77	62	64	77	62	61	69	60	58	64	52	52	64	52
5.....	70	76	63	65	82	63	65	79	63	55	73	60	58	70	53	58	68	57
6.....	66	76	64	65	82	65	63	77	62	58	70	58	60	75	51	54	75	57
7.....	65	74	60	65	73	64	63	77	62	62	85	58	60	70	56	60	72	55
8.....	68	79	64	65	78	65	68	76	62	63	80	61	56	63	54	68	76	59
9.....	65	76	65	61	74	62	69	74	63	58	67	60	55	65	59	66	70	48
10.....	66	76	64	63	73	60	62	74	63	57	66	56	60	64	44	50	60	50
11.....	67	78	63	64	75	62	64	81	63	60	71	57	52	65	48	45	67	49
12.....	64	75	64	65	79	64	67	81	64	55	72	58	51	69	52	47	70	47
13.....	66	80	66	64	83	66	64	73	65	60	68	58	64	75	71	45	67	49
14.....	68	78	65	65	80	65	66	77	65	58	67	59	50	76	65	46	63	44
15.....	66	76	63	65	80	67	70	79	63	58	68	58	58	81	65	45	61	44
16.....	65	72	64	64	75	63	60	71	60	58	67	58	59	81	56	44	62	44
17.....	63	74	60	64	76	61	62	73	61	56	67	57	60	70	53	44	62	42
18.....	63	76	63	64	76	60	64	75	60	58	69	55	49	71	46	41	62	42
19.....	68	77	64	64	73	60	62	70	61	58	71	56	49	70	50	43	60	43
20.....	66	77	62	65	74	62	64	71	60	59	64	58	51	73	48	43	62	45
21.....	64	75	60	62	77	63	62	70	56	59	67	52	52	66	48	43	63	46
22.....	65	75	63	61	77	64	62	70	57	58	68	52	56	61	48	43	60	52
23.....	63	76	61	64	77	65	54	70	59	56	65	57	53	59	54	52	64	56
24.....	63	75	62	66	80	64	58	72	63	56	67	54	60	62	50	53	63	58
25.....	61	75	62	68	81	68	61	75	62	55	66	49	51	62	47	56	61	58
26.....	62	75	61	66	92	71	64	75	62	57	70	54	58	63	46	58	62	59
27.....	63	76	60	76	87	71	60	72	60	58	70	54	51	64	48	58	61	59
28.....	64	76	62	73	88	72	59	79	69	60	66	54	52	66	52	59	59	59
29.....	65	79	62	72	80	71	58	67	58	60	68	56	54	70	54	57	64	58
30.....	70	82	64	69	78	65	58	67	58	58	73	52	58	68	56	55	60	57
31.....	65	80	62	69	75	63	.....	.....	.....	58	79	52	.....	.....	.....	52	62	55

RANGE OF THERMOMETER AT SANTA BARBARA—Continued.

1873.	JANUARY.			FEBRUARY			MARCH.			APRIL.			MAY.			JUNE.		
	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...	7 A.M...	2 P.M...	9 P.M...
1.....	51	64	50	42	52	47	48	62	52	62	72	66	63	69	57	76	76	63
2.....	50	63	54	42	52	46	48	66	50	60	68	60	60	70	58	68	71	60
3.....	55	62	52	43	56	49	48	68	50	58	64	48	62	65	56	59	70	59
4.....	54	61	51	42	58	50	49	70	51	51	56	46	60	67	54	59	70	58
5.....	51	65	60	45	61	51	50	62	54	54	63	51	57	67	55	61	71	58
6.....	51	66	56	43	61	52	52	61	50	58	65	60	56	67	56	60	71	58
7.....	50	70	59	46	66	52	49	66	51	58	68	51	56	65	57	62	70	60
8.....	52	72	55	44	59	55	54	65	54	58	68	53	58	67	56	60	71	58
9.....	50	76	55	50	59	50	52	72	71	58	63	51	56	67	57	57	70	58
10.....	52	73	57	51	62	52	62	72	60	50	63	51	56	66	57	59	70	60
11.....	55	64	51	48	60	55	59	73	57	53	63	51	57	67	57	60	73	60
12.....	50	61	54	52	66	54	55	61	56	53	61	52	58	65	58	60	71	59
13.....	51	72	54	55	61	53	53	58	56	58	67	53	60	70	57	61	70	60
14.....	52	62	50	46	61	48	54	63	56	60	75	58	63	66	58	60	70	60
15.....	50	67	52	47	59	48	56	62	55	63	79	60	62	68	57	62	72	60
16.....	49	71	52	50	59	46	53	62	55	65	80	63	63	67	55	68	71	61
17.....	51	74	55	40	55	43	55	70	61	58	67	55	56	65	56	70	74	66
18.....	50	73	53	46	50	46	68	75	61	54	63	54	60	69	56	70	72	62
19.....	49	73	55	48	56	49	60	72	57	56	65	55	61	71	55	64	74	62
20.....	49	71	55	46	62	49	58	71	56	58	65	58	65	71	59	63	72	61
21.....	53	69	52	46	62	50	58	63	60	60	73	59	59	68	55	63	71	60
22.....	46	72	52	52	67	56	57	63	57	65	75	68	66	70	57	65	74	61
23.....	47	59	49	54	60	57	59	64	52	58	64	56	65	70	58	68	75	60
24.....	49	67	54	57	56	47	54	62	53	53	64	55	62	71	59	62	73	59
25.....	50	69	52	46	56	46	56	65	53	56	65	58	60	68	57	63	73	61
26.....	51	64	49	44	56	47	53	64	55	58	65	55	60	68	58	70	75	62
27.....	53	71	55	46	60	51	54	68	58	58	68	55	60	68	57	71	80	64
28.....	47	64	53	48	60	49	59	65	53	59	64	58	65	72	58	68	74	63
29.....	49	67	51	.....	.....	.....	55	75	61	64	76	60	69	72	62	68	72	62
30.....	45	62	54	.....	.....	.....	62	75	61	68	77	57	70	73	69	66	70	60
31.....	42	54	52	.....	.....	.....	62	76	60	.....	.....	.....	72	78	77	.....	.....	.....

AGUA CALIENTE, OR WARNER'S RANCH SPRINGS.

Location.—San Diego County, California.

Access.—From San Diego, about fifty miles northeast, in a direct line.

Analysis.—Thermal sulphur-waters.

Remarks.—The following is the description of these springs as given by W. P. Blake, Geologist of United States Exploring Expedition:

“The thermal springs, generally known as the ‘Agua Caliente,’ are situated on the slope of one of the ridges at the most eastern part of the valley (Warner’s Ranch). They have long been resorted to by the Indians for bathing, and the cure of various diseases. The water boils up from out of a granite ledge, through a number of openings or cleavage-fissures, and in one place it appears to have enlarged the opening so that it has become nearly cylindrical. The water flows copiously from different apertures, and the united streams give a volume of water about equal to what would be delivered from a two-inch pipe under a pressure of one or two feet. These openings are in a slight ravine, which appears to have been the bed of a brook that is now deflected

from its course by a dam built for the purpose by the Indians. In descending towards the spring, the odor of sulphuretted hydrogen is at once perceptible, and a slight cloud of steam rises from the water. The temperature of the water was taken, and the following are the results:

First, or principal spring.....	142° F.
Second spring.....	141° F.
Third spring.....	140° F.
Fourth spring.....	140° F.
Fifth spring, ten feet distant.....	136° F.
Stream below the springs.....	130° F.
Stream above the springs.....	58° F.
Air.....	74° F.

Time, 9 A. M., November 30, 1853.

"Bubbles of sulphuretted hydrogen were constantly escaping, and the water was highly charged with it; and had an acid taste that was quite agreeable. There was only a slight deposit or incrustation on some of the rocks (consisting of sulphur). A small jet of steam was constantly issuing from a crevice near the main spring, producing a slight hissing sound like steam from a leak in a boiler." (1)

SAN BERNARDINO HOT SPRINGS.

Location.—San Bernardino County.

Access.—From the Town of San Bernardino, about fifty miles north-east from Los Angeles; thence, about five miles distant.

Analysis.—Pure and calcic thermal waters.

Remarks.—These springs are situated on the flanks of Mount San Bernardino. They are described as follows, by W. P. Blake, Geologist of the U. S. Survey, who visited them between the third and sixth of November, eighteen hundred and fifty-three:

"The warm and hot waters gush out from the granitic rocks on the flanks of San Bernardino and adjacent heights. In one place the springs are so numerous, and the water rises in such volume, that a good-sized mill stream of hot water is formed, which flows down into the valley, and is one of the principal tributaries of the Santa Anna River. This brook of hot water retains a temperature of 100° Fahrenheit, three or four miles from its source.

"I visited several of the springs on the sides of the sierra, between San Bernardino Mountain and the Cajon Pass, near the sawmill road. * * * It was evident that the adjacent granite was very near the surface, as shown by one or two outcrops, from one of which the hot waters issued. Small springs rise at intervals of ten or twenty feet along a distance of thirty or forty rods. Their waters unite, and form a little stream that empties into the brook a short distance below. The banks of the stream were thickly overgrown with grass. A dense mass of beautiful green *confervæ* grew from the bottom and sides of the channel, and floated in rich waving masses in the hot water. In the immediate vicinity of the springs, however, no vegetable growth was visible. The rocks and gravel in contact with the water were covered with a snow-white incrustation, and little twigs and leaves that had fallen into

(1) Government Explorations for Pacific Railroad, vol. v, p. 106.

it were softened to a white, pulpy mass, and were partly incrustated. This was also the case with insects that were lying dead in the shallows of one of the springs, but I could not observe that in either case any petrification or internal deposit of mineral matter had taken place. The following temperatures were observed: 172, 169, 166, 130, 128, 108° Fahrenheit. The temperature of the hot stream below all the springs was 130° Fahr., and the mountain brook only 65° Fahr. Temperature of air, 76° Fahr.

"The white crust was not found in equal quantities at all the springs. It appeared to be most abundant at one of them. * * * An analysis of the crust (by J. D. Easter, Ph. D.) since the return of the expedition, gave the following results:

"The aqueous extract contained only a small proportion of chloride of sodium. In hot hydrochloric acid, the mass dissolved with strong effervescence, leaving a residue of silica and alumina. The solution contained:

"Lime (carbonate), chief constituent.

"Silica (soluble in acid).

"Magnesia.

"Alumina and oxide of iron, traces.

"Phosphoric acid, trace.

"The springs are estimated to be at least five hundred feet above the level of the Santa Anna, at the Mormon settlement, and thus nearly sixteen hundred and eighteen feet above the sea.

"These springs are not the source of the large stream of water first referred to. It takes its rise further eastward, near the mountain of San Bernardino. I regret that I could not visit its source, as the springs must be of great volume and high temperature to send forth such a large stream of water retaining its temperature a long distance from the mountains. I was informed there are several other localities of hot springs along these mountains, and there are, no doubt, many that have not yet been discovered. The large stream of hot water appears to be nearly pure." (1)

Besides the springs that have been enumerated, there yet remain many others, of noted qualities, to be described; in fact, the resources of the State, in this respect, are capable of being developed to an almost indefinite extent, and we feel assured that when all the waters of the Pacific Coast shall be thoroughly analyzed, we shall find some of them equal the celebrated alkaline thermals of Vichy, and the muriated alkaline thermals of Ems. I have endeavored to arrange all the well-established facts relating to the climate, surroundings, and properties of the waters passed under review, in such manner that they shall be readily accessible; and it is hoped that a sufficient knowledge of these restorative agencies has been imparted to enable all to judge correctly of their specific character and adaptations. A wide field is now opened up for the exercise of the skill and judgment of the medical adviser in selecting for his patient the waters best adapted to the nature and necessities of his case.

(1) Government Explorations for Pacific Railroad, vol. v, pp. 63, 64.

CHARACTER OF GOOD WATER.

We are now in a position to consider the qualities which good potable water should possess, and on the abundant supply of which the healthfulness and prosperity of our cities and towns so largely depends. Dr. Parkes gives the following as the essential characters in relation to the dissolved constituents: Organic matter should not exceed one and one half grains per gallon; carbonate of lime, sixteen grains; sulphate of lime, three grains; carbonate and sulphate of magnesia, three grains; chloride of sodium, ten grains; carbonate of soda, twenty grains; sulphate of soda, six grains; and the total solid contents should not exceed thirty-five grains per gallon.

CONTAMINATION WITH LEAD.

Water is occasionally liable to be contaminated by contact with lead, and as this metal is largely used for pipes and cisterns, the possibility of this taking place is frequent. The quantity which may prove injurious is often very small. From cases which have occurred, it seems probable that the habitual use of water containing one tenth to one twentieth grain per gallon may be dangerous. In fact, all lead contamination of water is to be looked upon with the gravest suspicion, as liable to set up general disorder of the system, especially of the digestive organs, or even to produce lead colic, paralysis, etc. The water most liable to become poisoned by contact with lead, is that which contains little (less than one fifteen thousandth part) or no saline matter, as in rain and very soft water, and this is facilitated by the presence of organic matters, and the more so if nitrates and nitrites are likewise present. The presence of one five thousandth of its weight of sulphate of lime in water, entirely prevents lead contamination. Junction with pipes of a different metal, facilitates the action of water on those made of lead, by establishing galvanic action. A notable instance of this, which occurred in Sacramento, will be found in the following statement of the local Board of Health. To prevent poisoning of this kind, the lead is often covered with a coating of various substances, such as tin, bitumens, some resins, etc. The use of iron pipes and cisterns, of course, entirely prevents the mischief, and is, in a large number of cases, desirable, if only as a precautionary measure:

LEAD POISONING FROM COMPOSITE WATER PIPE IN SACRAMENTO.

In the discharge of their duties, both officially and professionally, the Board of Health deem it incumbent on them to publish the following statement:

No less than seventeen cases of illness, presenting all the most unequivocal signs and symptoms of lead poisoning, have come to our knowledge within the last month in this city. Most of these cases have partaken of the characteristics of slow, chronic poisoning, clearly diagnosed in lead, from ordinary colic, by a blue line on the dental edge of the gums, whilst some of them have been suffering terribly for several months, previously to our becoming cognizant of the fact, with intense muscular pains and loss of power, more or less approximating paralysis—all of them occupying residences supplied with water from pipes made of a patent composite metal, advertised and known as a

"sanitary water pipe." It is here proper to remark, that the earlier symptoms of this affection are so obscure in their origin, and simulate so closely other diseases of the stomach and bowels, that physicians are frequently in doubt as to the true nature of the cause of suffering until sufficient time has elapsed to obtain positive signs of metallic poisoning—lead, which is the most easily dissolved metal in water, and at the same time most poisonous in minute quantities, being a cumulative poison. In no single instance referred to above had the patient not been subjected to the action of the water served from the aforesaid composite metal pipe; and not a solitary case has been heard of in the whole city of symptoms, coördinate with those described, where the old lead pipe had been in use.

As soon as our suspicions became aroused as to the cause of suffering, directions were forthwith issued to discontinue the use of the water supplied by the composite pipe, when a steady and happy alleviation of the most urgently distressing symptoms—such as the dragging and twisting pain of the bowels, the obstinate constipation, and, in the worst cases, vomiting—ensued. Under these circumstances, a meeting of the Board of Health was called, and the whole matter confided to the hands of our Secretary, with a request that he would make such an investigation as the emergency rendered necessary, and report the result to the Board. We now beg leave to call attention to the following very satisfactory report which has been adopted by us, and which, it will be observed, not only confirms the correctness of the suspicions that were entertained, but also positively establishes the fact that the composite pipe in question is not only detrimental to the health of our citizens, but is also dangerous to life, and should under no conditions be employed in distributing the waters, at least of the Sacramento River.

(Signed:)

I. E. OATMAN, M. D., President,
F. W. HATCH, M. D.,
W. R. CLUNESS, M. D.,
G. L. SIMMONS, M. D.,
THOS. M. LOGAN, M. D., Secretary,
Board of Health.

REPORT OF THE SECRETARY OF THE BOARD OF HEALTH.

GENTLEMEN: In compliance with your request relative to the matter of the late poisoning by the use of the composite water pipe recently introduced into the city, I would report: That as a first and most important step in the inquiry, I procured four samples of the suspected water, which had been allowed to remain from twelve to twenty-four hours in the service pipes of the houses in which the cases of illness had occurred, and submitted them to J. F. Rudolph for chemical examination and qualitative analysis. The result will be found in the following letter:

"Dr. T. M. Logan, Secretary of the Board of Health:

"The four (4) samples of water drawn through composite pipe, and supposed to have caused lead poisoning in those who had used it, were examined in the manner given below. The evidences of lead were clear, a quantity being obtained equivalent to one quarter ($\frac{1}{4}$) of a grain of

the metal to the gallon of water; of arsenic a mere trace only was had of antimony the same may be said.

"The different samples were similar in appearance, resembling partially settled water, being somewhat milky or opalescent.

"As no precipitate was had with hydrochloric or sulphuric acids, or iod. potass, a portion of each sample was separately concentrated by evaporation, acidified with nitric acid, and evaporated to dryness. The residue was dissolved in a small quantity of same water and tested, one portion with sulphuric acid, and another with iod. potass, obtaining, in every case, abundant evidences of lead. In one instance, a repetition of the process was had with two (2) ounces of water, with similar results.

"From two (2) pints of water one eighth ($\frac{1}{8}$) of a grain of iodide of lead was obtained, equivalent to one half ($\frac{1}{2}$) grain to the gallon of water. As the iodide contains about forty-five per cent of lead, it would indicate one fourth ($\frac{1}{4}$) grain of the metal taken up by that quantity of water (one gallon).

"A portion of water was drawn from my office hydrant (the lead-pipe in which has been in service about eight (8) years), and subjected to the same process, without finding the slightest trace of lead impregnation.

"On reporting the above, you requested me to seek for evidences of arsenic and antimony. Sixteen (16) ounces of water were concentrated to two (2) ounces by evaporation, digested with sulphuret of potassium, filtered, the filtrate diluted and boiled with excess of acetic acid. The precipitate from the acetic acid was well washed, mixed with nitre and carb. soda, dried and carefully fused, digested with hot water, filtered; nitric acid added to slight excess, and heated. Nitrate of silver was then added, and when cool, filtered, poured into a test tube, and dilute ammonia carefully dropped on the surface of the liquid, then set aside, after some time showing a very slight brownish red precipitate, indicating arsenic.

"J. F. RUDOLPH.

"SACRAMENTO, April 8th, 1872."

It will be seen from this searching investigation, that while a remarkable quantity of lead was found in the water taken from the composite pipe—a quantity amply sufficient to produce the most pernicious effects of lead poisoning, inasmuch as the one hundredth of a grain of lead to the gallon has been known to produce palsy in persons who habitually drank it (1)—no trace whatever of lead impregnation was discovered in the water drawn from the old pipe, which had been eight years in use in the laboratory. Without going any further, we have here abundant confirmation of the suspected cause of illness, and evidence abundantly sufficient to condemn and interdict, as destructive to human life, the use of the composite pipe for the distribution of the Sacramento River water. Whether water from other sources will produce the same resultant effects is a question which remains to be solved. Pushing the investigation farther, I find, on examination of the two different pipes themselves, from which the water that was examined had been obtained, First—That in the old lead pipe, from which the water that contained no traces of lead was procured, there was found a closely adherent and very thin film—the sulphate of lead—deposited uniformly upon the

(1) A celebrated case occurred in the royal family of France, at Claremont, where one third of the persons who drank of the water, which contained only one tenth of a grain of lead in a gallon, died.

inner surface of the pipe. This observation is not a new one, but has often been made before, respecting other river water, the minute quantities of salines almost invariably present protecting the lead from further chemical action; whereas, if the water be perfectly pure, it soon becomes impregnated with lead. Second—That in the new composite pipe there was seen no such film of the sulphate of lead as found in the old pipe, but simply a loose deposit of river mud, on removing which, streaks of a blackened and slightly corroded surface were made apparent. In this latter fact is to be found the solution of the lead contamination and the deplorable effects that resulted therefrom. By water contact the galvanic action created by the dissimilar metals entering into the formation of the composite pipe, promotes corrosive action, and hence the water becomes poisonous. "Precisely the same evil is met with," states the Boston Journal of Chemistry, for July, eighteen hundred and sixty-eight, "in the use of metallic double lined ice water pitchers. The lining of these vessels is often made of dissimilar metals, and the parts joined together with solder, into which lead enters as a constituent. *

* * Pure water acts much more energetically upon lead and other metals than the ordinary kinds; and hence the action is greatly promoted by the ice water, which is very nearly as pure as that which is distilled."

With the knowledge of these data, on which to base an opinion, I have no hesitation in advising that we recommend that an ordinance be passed prohibiting the laying down and further use of the composite metal pipe for the distribution of the Sacramento River water.

THOMAS M. LOGAN. M. D.,
Secretary Board of Health.

SACRAMENTO, April 12th, 1872.

ACCIDENTS AND EXPLOSIVES IN MINES.

Mining is one of the most important interests in the State, and the numerous accidents resulting in injury or loss of life, incurred in pursuing mining operations, have not escaped the attention of the Board. From the very nature of their occupation, miners are more exposed to danger than perhaps any other class of operatives. Premature explosions, defective blasts, breakage of machinery, caves, fires, etc., all combine to make their lives hazardous.

There are laws now in existence, which to a certain extent, provide for the protection of miners as regards outlets from a mine in case of fire, and in other particulars. They are, however, a dead letter in most cases, for we have yet to hear of an instance where infraction of the rules has been punished. In a good many mines on this coast, rickety old hoisting gear is used for hoisting men, which is dangerous in the extreme; but the owners argue that if anything breaks, it will be with a heavy load of ore, not men. We are glad to say, however, that good, secure machinery is the rule of this coast, and bad machinery the exception. In speaking of the punishment of mine owners for keeping damaged or insufficient gear, etc., an illustration of the method they are dealt with, under the new English Mining Law, comes to us, says the *Mining and Scientific Press*, of July fifth, eighteen and seventy-three, from which we here copy, in one of our late foreign exchanges:

A boy was killed by falling down a shaft in a colliery. At the inquest it was shown that the machinery was of the most antiquated description. A gin was erected at the top of the shaft, to which was attached a couple of ropes and cars; as the one descended the other ascended, communication being made to the man on the dump, to set the machinery in motion, when required. The man was frequently absent, and a neighboring quarryman discharged his functions, while at other times they were done by passers-by. One day the boy gave the signal to come up, which was answered by some one unknown, and he hitched himself in the chains and ascended. The weight of the descending car proved too heavy a balance, he went up with a surge, and on coming in contact with the gin, was precipitated down the shaft and killed. The jury returned a verdict of manslaughter against the proprietor. This is an exceptional case, but one warranted to impress mine owners with a healthy regard for the lives of their employes. The English Mining Laws recently passed are much more stringent, with regard to these particulars, than ours. One provision creates a system for securing the competency of managers; another lays down certain general rules for the prevention of accidents; a third provides that an amount of ventilation shall be produced in every mine, sufficient to dilute the noxious gases; a fourth establishes a Board of Inspectors to see that the various provisions are carried out. It is also provided that the mines shall be inspected, at least, once in twenty-four hours, and a regular report made.

At the regular quarterly, held on the nineteenth April, eighteen hundred and seventy-two, the attention of the Board was called to the subject of dynamite, or giant powder, when used for mining purposes, by the following letter:

GRASS VALLEY, NEVADA COUNTY, CALIFORNIA, }
March 8th, 1872. }

DOCTOR LOGAN, *Secretary State Board of Health*:

DEAR SIR: You probably have heard of the controversy and trouble existing here, at present, respecting the use of dynamite, or giant powder, in our mines—one party insisting that its use is not more injurious than the common black powder to the health of the miners; whilst another, with equal pertinacity, assert that its use will destroy the health of the miners, as well as all others underground inhaling its fumes.

Would you please investigate the matter; and, as it affects the well-being of a large class of our community throughout the mining districts, would you bring the matter before the State Board of Health at the first opportunity?

I am unable to determine from the data I have at present, that its use produces any more serious effects than headache, nausea, and some prostration of the nervous system, which passes off in a few hours. So far, I have seen no one that seemed to suffer any permanent trouble. The point to determine, particularly, is, whether its effects are merely transitory—such as the use of tobacco, or other substances, produces when first used, and which the system in a short time becomes habituated to—or will it have permanent injurious effects upon the vital powers?

Miners, here, as a class, are opposed to its use from prejudice, etc., and their statements, in consequence, are not wholly reliable.

At Smartsville, and other places, I have talked with miners who have used it continually for one or two years without any serious trouble, beyond headache and nausea, for the first few days of its use, and who even declare a preference for it to the common black powder.

A reply, at your earliest convenience, as to what you know of its effects, and how its use might affect the health of miners, will greatly oblige,

Yours, very truly,

JAS. SIMPSON, M. D.,
Grass Valley.

The reading of this letter gave rise to considerable discussion. Although no definite conclusions were arrived at, still it seemed to be the sense of the Board that no more injurious effects would result from the use of giant powder in properly ventilated mines than from ordinary gunpowder; but that, owing to its far greater power and effectiveness in blasting, the miners had got up a prejudice against its use, because the demand for their labor was thereby curtailed. A resolution was, nevertheless, adopted requesting the Secretary to investigate the subject and report at some future day. Accordingly a correspondence was opened up with several medical and scientific societies, as well as with individuals in the State, soliciting information, with the following results:

Chief Engineer Montague, of the Central Pacific Railroad, who had had considerable practical acquaintance from blasting, with dynamite, or what is equivalent to it, nitro glycerine, stated, that he believed the fumes were more or less noxious, when confined and not speedily dispersed by currents of air, and that he himself had experienced headache when exposed to its influence. Still, as he had never heard of any permanent ill effects from its employment, he was inclined to think that the noxious influence of the fumes were only temporary.

Colonel A. W. Von Schmidt, engineer, concurred in the opinions expressed by Mr. Montague, and further stated that the mere handling of the substance would in his instance produce the same temporary effects as the fumes.

No further information with regard to the toxic properties of this substance was elicited from other sources—but much practical knowledge has accrued. As the nature of the substance is little known, we feel confident that some account of its manufacture and properties will prove of interest and value to those who are in the habit of handling this most dangerous compound. To the kindness of one of the Engineering Corps of the Central Pacific Railroad, I am indebted for the following account of the manner of preparing and using nitro-glycerine:

NITRO-GLYCERINE.

A set of experiments on the efficiency of nitro-glycerine were made in the Spring of eighteen hundred and sixty-six, with results very decidedly in its favor, but the accident from its explosion at San Francisco, April sixteenth, put a stop to the experiments, and for a time all idea of using it on the road. In January, eighteen hundred and sixty-seven, fears began to be entertained that the Summit tunnel might not

be finished in time for the track, and several methods of expediting the work suggested, none however so promising as nitro-glycerine. After a few days trial, it was decided to use it instead of powder.

A frame house was accordingly put up near the shaft for its manufacture, and Mr. James Houden, of San Francisco, put in charge of making it. The process, as described by him, is as follows:

The acids used should be stronger than the ordinary commercial article; the sulphuric should be 66° Baum, and the nitric 49° to 50°. They are mixed in the proportions of two parts of sulphuric to one part of nitric.

Thirty-five pounds of the mixture is put in a stoneware jar, and the latter immersed in snow or cold water. It may be set in water at 45° F., and the temperature may rise to 75° without danger. When well cooled, seven pounds of pure glycerine is poured in slowly while the contents of the jar is stirred. By the time that half the glycerine has been stirred in, the temperature rises to 60°. At that point the mixing must be stopped, as the acid would soon reach boiling point, and begin to spurt and bubble about, to the danger of the maker. After ten minutes delay, the mixture will have cooled so that the remainder of the glycerine can be poured in. Another ten minutes rest is now given to cool, and the nitro-glycerine formed is ready to be washed. This is done by pouring the mixture slowly into a large tub of water, whirling the water rapidly with a broad stick while pouring in at the edge. The nitro-glycerine, being heavy and insoluble, sinks to the bottom, while the free acids are absorbed by the water. The latter being of no further use, is then poured off, and the nitro-glycerine remaining in the bottom of the tub is then collected.

By this process three equivalents of hydrogen in the glycerine are replaced by three of nitrous acid. The result is an oily liquid of a light yellow color, insoluble in water, and not subject to evaporation. It freezes at 40° F., and can be heated with safety to 212°, but explodes at 360°. It is highly poisonous; a single drop taken in the mouth producing violent headache, and several drops, death. The gases arising when its explosion is complete, are, for each volume of the oil, five hundred and fifty-four volumes of steam, four hundred and sixty-nine of carbonic acid, thirty-nine of oxygen, and two hundred and thirty six of nitrogen. They are all transparent, and less objectionable than those from powder; but as minute particles of the oil appear to escape explosion, and be disseminated in the air, headaches often arise from entering a tunnel immediately after a large quantity has been fired. After using nitro-glycerine for a few days, it does not have this effect on the workmen; and in any case, much less time is lost in waiting for its gases to be entirely dissipated, than with powder.

In the headings, glycerine has been used almost entirely in the cartridges. These are from four to eight inches long, with tin bottoms and wooden stoppers; diameter, an inch or an inch and a quarter. The stopper has a hole bored through, in which is put a small quantity of powder, the fuse closing one end, and a plug of wax the other. The explosion of the powder in the plug drives the wax into the glycerine, which is fired by the shock.

The holes are tamped with sand or earth, as for powder, but not so tightly. Any blows on the cartridge should be avoided. It is very rarely that they miss fire. When they do, it is best not to drill out the old charge, but to scrape out carefully half of the tamping, and put a

small cartridge in. When this is fired, the shock will explode the bottom charge.

After the heading in Tunnel Six had been taken out, nitro-glycerine was used in the bottom. For this purpose, two and a half inch drills were used, and the holes made six or seven feet deep, and about the same distance back from the face. The load varied from two to fifteen pounds of oil, averaging half a pound to the yard of rock. The oil was brought on the work for the bottom holes in bottles, and poured in through a long tube with a funnel. At the top a small tin cartridge, like those used in the heading, but filled with powder instead of glycerine, was found to be the best mode of firing these large holes. I may mention that Tunnel Six is through solid granite.

Comparing the progress made with powder, and that made with glycerine, in the same rock, shows a difference of fifty-four per cent in favor of the latter; and in another tunnel, a difference of seventy-four per cent in its favor. The additional progress in heading arises from using one and one fourth inch drills, instead of two and one fourth to two and one half, as with powder. In the bottoms it is due to fewer holes being required, and to the rock being broken into smaller pieces. Both in headings and bottoms, less time was required to clear the tunnels of smoke, than when using powder.

The cost of nitro-glycerine made here was about seventy-five cents per pound, of which fifty cents covered cost of materials.

Nitro-glycerine has about eight times the force of the same weight of powder; so that the same effect may be produced at a less cost with it, as at least half the labor in drilling is saved, while the rock is broken smaller. There can be no doubt, that for most rock excavations, it is the cheapest material to use.

In sidehill cuttings, where seams can be taken advantage of, and it is desirable to waste the material, powder will often be more useful; but the two should be used together.

The best way of insuring safety is to make nitro-glycerine at the works from day to day, as required, and thus avoid storage and transportation as much as possible—long confinement in close vessels, with high temperature, making it much more liable to explode with slight shocks. When in good order, a flame will burn but not explode it—a heavy concussion being required.

DYNAMITE, OR GIANT POWDER.

From the above communication it appears, that in order to guard against explosion, it becomes necessary to prepare the nitro-glycerine that is daily used, on the spot. This is not at all times convenient or practicable, and consequently means have been devised to insure safety in its handling and transportation. The great danger of explosion from nitro-glycerine arises from sudden concussion, and, of course, the secret of securing safety therefrom lies in protecting against this, or, as it is termed, by "cushioning" it.

The sharpness and violence of the concussion of a blow is what explodes it. A nail can be driven in by a blow, not pushed in, unless with great force. The principle is simple, and well understood. If a soft substance is placed between the nail and hammer the blow has little effect. The nitro-glycerine is put in a cushion, so to speak. There are

different substances used for this purpose, the best of which is infusorial earth. When in that condition, you might as well try to drive a nail with a sand bag, as explode it by concussion. It is then giant powder. The infusoria in the earth used form so many little tubes, the force of capillary attraction absorbing a large amount of nitro-glycerine; which is cushioned in this manner. Every material with which nitro-glycerine is mixed, which has not these absorbent properties in a high degree, is dangerous, for if by any means nitro-glycerine runs or is squeezed out, you have all the original dangers of pure nitro-glycerine. Common gunpowder absorbs a considerable portion of nitro-glycerine, but is more dangerous than infusorial earth, as it comes out easier. It will hold about fifty-five or sixty per cent, while the infusorial earth holds seventy-five per cent. In warm weather it exudes from the powder badly.

Cotton is a poor absorbent and very dangerous; chalk also; magnesia is a good one. The present Hercules powder, which used to be made of black powder and nitro-glycerine, is said to be made with magnesia, and in ordinary temperatures may be deemed a safe absorbent. The higher the temperature the more liability to leakage in all of these substances. These compounds explode more readily according to temperature and wetness or exudation.

Giant powder, formed of nitro-glycerine, is well known in the East, and has been used in large quantities here since eighteen hundred and sixty-eight, and in Europe, since eighteen hundred and sixty-seven. No accidents have ever occurred with it in transportation. It never has exploded where the blame was chargeable to the powder. The Austrian government having first prohibited its transportation on railroads and stages, in eighteen hundred and sixty-nine reversed the law, it having been proven that it was perfectly safe. It is carried everywhere on this coast. There are five factories of it in Europe, one in San Francisco, and one in New Jersey. The consumption is from one million and a half to two million pounds per year, carried about in every possible way. All the explosions which have occurred here were caused by nitro-glycerine, not powder. At the explosion occurring here, at the Giant Powder Company's works, in eighteen hundred and sixty-nine, when the nitro-glycerine blew up, there were five thousand pounds of giant powder within thirty feet of the nitro-glycerine, which was unharmed. The concussion blew open the boxes, but did not explode the powder. The nitro-glycerine was left under water at that time, which caused the explosion, as spoken of above. Very recently, when the steamer "Meteor" burned up, on Lake Michigan, there were eight thousand pounds of giant powder aboard, which all *burned* up, with the entire cargo, without any explosion whatever. Here are two simple cases illustrating that it will not explode by ordinary concussion, or by the action of heat.

In the matter of heat it is peculiar. It can be burnt. If a small particle of the powder is put on a bar of iron, one end of which is in a fire and red hot, the red end will burn it; the cold end has no effect; but on the part where there is a dull heat there will be a semi-explosion or detonation once perhaps in thirty or forty times in trying it, but not uniformly. Put this in a gas pipe, under similar conditions, and it will explode violently, being confined; but unless the confinement is such as to restrain the gases, it will burn up. In tin vessels or wooden boxes there is no explosion, but in a quicksilver flask, closed tight, it would burst. The large caps made for the purpose are the only things that

will explode it. If a small piece of giant powder is placed on a hard substance and ground up fine by rubbing with a knife for some time, and then struck, it will explode. But then it is nitro-glycerine, not powder. In grinding, the capillary tubes are destroyed, the powder turns from white to brown, and then darker, while a dampness is perceptible, showing that the nitro-glycerine has exuded or been forced out. These conditions are not likely to occur in every day use of the powder.

It will be seen, from the foregoing, what danger there is for ignorant persons to experiment with nitro-glycerine and its compounds. If the nitro-glycerine used is not thoroughly washed free of all acid, it is likely to explode at any time. If the gun cotton exuded the nitro-glycerine, as it would, the slightest jar would be sufficient to explode it. All these experiments were made by Nobel, the patentee of giant powder, when first inventing his compound. They were all found to be dangerous. The use of black powder was at that time, and since, tried, but discontinued, for it would not hold the nitro-glycerine in warm weather, and was therefore dangerous. To show that a concussion will not explode giant powder, and that the nitro-glycerine explosion could not have set it off, the instance of the violent explosion in San Francisco may be cited, as well as many others. In England, very recently, a box of the powder was put on the buffer of a car, which was allowed to run down a grade and collide with another violently, smashing up both cars, but no explosion took place. The flames would burn but not explode it.

The verdict of the Coroner's jury, convened at Virginia to hold an inquest on the bodies of several who were killed on June twenty-ninth, eighteen hundred and seventy-three, states that the jury believed that the explosion was caused by gun cotton saturated with nitro-glycerine in the deceased Van Bokkelen's room. It is not likely that the nitro-glycerine was made there, but must have been shipped there by parties unknown. In doing this the law was not only violated, but people's lives were endangered while it was *in transitu*. The poor fellows who were making the experiments lost their lives by them, and others suffered from their ignorance and carelessness. It is to be hoped that what we have said will deter others from experimenting in the same direction, without a thorough knowledge of the conditions under which nitro-glycerine will explode, and even then the utmost precautions must be taken to prevent explosions. (1)

An excellent suggestion, in consequence of the many late calamities which have occurred in the lower depths of mines by foul air and fire, has appeared in some of our daily journals, which is to arch over each tunnel connecting the different levels of the mine, with solid masonry for a short distance; and in these archways place, a few feet apart, two sets of iron doors, so arranged that they may be closed at a moment's warning. The double doors of iron will resist any explosion that is likely to occur, and at the same time will prevent deadly gases finding their way through in sufficient volume to strike down the workmen without a moment's warning, as they were stricken during the late fire in the Nevada mines, and in that of eighteen hundred and sixty-nine. It is believed that such an improvement would be a wall of defense against the advance of fire, and enable the men to escape before the flames, or poisonous gases attending explosion, could overtake them in their retreat.

(1) To the columns of the "Mining and Scientific Press," of San Francisco, we are chiefly indebted for the above compilation.

SECURITY IN MINES.

Since the last accident in the Yellow Jacket Mine, on the Comstock lode, people have commenced to think that the mines are subject to be blown up or catch fire at any time. At the Coroner's inquest, held after the late explosion, one of the miners testified that when in the employ of the Gould & Curry Company, upon several occasions explosions occurred in the mine, caused by candles being brought in proximity to carbureted hydrogen gas. Many think that the great calamity of eighteen hundred and sixty-nine was from the same cause as the late explosion. The *Virginia Chronicle* says that when we take into consideration the fact that one of the explosions occurred on top at the old Yellow Jacket works, eighteen hundred feet from where the fire was in the thirteen hundred-foot level of the Jacket mine, we may imagine to what extent a mine may be filled with gases. We add a portion of the verdict of the Coroner's jury, that our readers may judge for themselves: "It is the unanimous conviction of the jury that the above named parties came to their death from asphyxia, caused by inhaling carbureted hydrogen gas while in a state of combustion, together with other gases. We are also of the belief that the deadly gases were generated by the fumes of charcoal rising from the Crown Point and Belcher blacksmith forges, taken in connection with other chemical reactions going on in the mine, from earth, minerals, and decayed wood. We find that the fire was kindled in the winze over and from sparks rising from the Belcher blacksmith shop. We severely censure the managers of the mine for allowing the blacksmith shop to be located underground, thereby causing the death of six highly esteemed citizens; and we also recommend that hereafter no blacksmith shops, or fires of any kind, be allowed in any of the mines on the Comstock lode."

Mr. Samuel Jones, Superintendent of the Crown Point mine, sensibly intends taking some precautionary measures to prevent loss of life in case of such accidents. His plan, as published in the *Enterprise*, is as follows: He intends arching over each tunnel connecting on the several levels of the Crown Point with other mines, with solid masonry for a distance of several feet. In these arched ways he will place, a few feet apart, two sets of iron doors, so arranged that they may be closed at a moment's warning. The double doors of iron will resist any explosion that is likely to occur, and at the same time will prevent deadly gases finding their way through in sufficient volume to strike down the workmen without a moment's warning, as they were stricken down during the late fire, and in that of eighteen hundred and sixty-nine. The drifts being clear of timbers for a considerable distance, it will cut off the mines adjoining it and form a perfect wall of defense against the advance of any fire that may occur on the outside of the mine; and in case of a fire in the Crown Point, the arched drifts and iron doors would serve to prevent the fire spreading to the mines adjoining. The cost of doing this work would be a mere trifle, when we consider the value of the mine and the sense of security such an arrangement would give to both the miners and the owners of the mine.

These mines contain such a large amount of timber that if they once caught fire it would take probably several years before the mines could be entered. The caves ensuing would destroy a large amount of property, and, perhaps, some lives. Mr. Jones' plan seems a good one, and as blacksmiths' forges will probably be abolished in the mines, and

sent to the upper regions, and additional precautions adopted, we do not expect to hear of any more accidents until this one is forgotten. The miners themselves are, generally speaking, the most careless people in the world, never thinking of danger until they meet it face to face. This being the case, it becomes the duty of their employers to adopt the necessary precautions to prevent accident. ⁽¹⁾

CONCLUSION.

In bringing this report to a close, I would reiterate that it was in readiness at the time required by law (July last), but was retained, as stated in the beginning, in the hopes of receiving complete returns of marriages, births, and deaths. The publication was thus delayed until the accumulation of more pressing work in the State Printer's office rendered its earlier printing impracticable; and so, the incidental haste, at the last hour, has been the cause of several errors and omissions. This is particularly to be regretted in the instance of the table exhibiting the number of indigent sick in charitable institutions. The reader can, however, readily supply the missing calculations from the data afforded.

To "take cognizance of the interests of health and life among the citizens generally," and to that end "to place themselves in communication with the local Boards of Health, the hospitals, asylums, and public institutions throughout the State; to make sanitary investigations and inquiries respecting the causes of disease, especially of epidemics and endemics, the sources of mortality, and the effects of localities, employments, conditions, and circumstances on the public health;" to "gather such information in respect to these matters as they may deem proper for diffusion among the people;" to "devise some scheme whereby medical and vital statistics of sanitary value may be obtained;" to perform the duties of "an Advisory Board to the State in all hygienic and medical matters, especially such as relate to the location, construction, sewerage, and administration of prisons, hospitals, asylums, and other public institutions;" to inquire into "the effect of the use of intoxicating liquor, as a beverage, upon the industry, happiness, health, and lives of the citizens of the State;" and, "at each biennial session of the Legislature, to make a report of their doings, investigations, and discoveries, with such suggestions as to the legislative action required as they may deem proper"—such are the extensive, laborious, and responsible duties assigned to this Board.

I submit that, while endeavoring to comply with these requisitions of our organic law, I have adhered as closely as possible to the headings of the various subjects that have come under the consideration of the Board, and now refer to the following Appendix for several reports, lectures, and other documents, which it was deemed best to publish in such order. It is trusted, that a case has been clearly made out, showing the paramount necessity of a carefully digested system of State Medicine, and the importance of adopting such amendments

of the Code, relating thereto, as is herewith recommended, for the harmonious working of the various branches of sanitary police, and, consequently, for the more effectually accomplishing the ends and purposes for which the State Board of Health was created.

All of which is respectfully submitted.

THOS. M. LOGAN, M. D.,
Permanent Secretary State Board of Health.

SACRAMENTO (Cal.), November 1st, 1873.

APPENDIX.

EXTRACT FROM THE

REPORT OF THE

COMMISSIONERS OF THE LAND OFFICE
IN RESPONSE TO A RESOLUTION
PASSED BY THE HOUSE OF REPRESENTATIVES
ON JANUARY 10, 1882
RELATIVE TO THE
LANDS BELONGING TO THE
UNITED STATES
IN THE TERRITORY OF ARIZONA
AND THE TERRITORY OF NEW MEXICO
AND THE TERRITORY OF COLORADO
AND THE TERRITORY OF IOWA
AND THE TERRITORY OF KANSAS
AND THE TERRITORY OF MINNESOTA
AND THE TERRITORY OF NEBRASKA
AND THE TERRITORY OF NORTH DAKOTA
AND THE TERRITORY OF SOUTH DAKOTA
AND THE TERRITORY OF WISCONSIN
AND THE TERRITORY OF ILLINOIS
AND THE TERRITORY OF INDIANA
AND THE TERRITORY OF OHIO
AND THE TERRITORY OF PENNSYLVANIA
AND THE TERRITORY OF MARYLAND
AND THE TERRITORY OF DELAWARE
AND THE TERRITORY OF VIRGINIA
AND THE TERRITORY OF NORTH CAROLINA
AND THE TERRITORY OF SOUTH CAROLINA
AND THE TERRITORY OF GEORGIA
AND THE TERRITORY OF ALABAMA
AND THE TERRITORY OF MISSISSIPPI
AND THE TERRITORY OF LOUISIANA
AND THE TERRITORY OF ARIZONA
AND THE TERRITORY OF NEW MEXICO
AND THE TERRITORY OF COLORADO
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AND THE TERRITORY OF MISSISSIPPI
AND THE TERRITORY OF LOUISIANA

THE LOS ANGELES COUNTRY;

ITS CLIMATE AND DISEASES.

By J. P. WIDNEY, M. D., Los Angeles.

California, apart from its minor differences and peculiarities of climate, is divided, by one prominent headland upon the coast, into two climatic divisions. That headland is Point Conception. North of it the northwest wind, cold and bracing, but to the invalid and feeble chilling and depressing, reigns supreme.

The Sierras run parallel with the coast, but far in the interior, allowing a system of long valleys with a general northwesterly bearing, which are swept full length by the prevailing current of cold air.

Near Point Conception, however, the main range of the Sierras and the coast line draw near to each other, while spurs and broken mountains interrupt the system of valleys and oppose a barrier to the cold air current from the northwest.

The coast begins to deviate from its general northwest bearing, and trends sharply to the east. The result is a mild, equable climate, with only a gentle west wind from the ocean, cooling the air.

The mountain chains follow near the coast, except at what is known as the Los Angeles country. Here they bear off directly eastward, and circling around, to again approach the sea, wall in a system of valleys having an area of some three thousand square miles, and extending back nearly one hundred miles from the ocean. Thus, while at other points in Southern California the only available climate to be found is a strictly coast climate, with its attendant moisture and occasional chill, there is here a choice, ranging from the coast to the warm, dry, sheltered interior.

TOPOGRAPHY.

The Los Angeles Valley, broad and open, faces southward upon the ocean. Toward the southeast it narrows into a coast plain, twelve miles in depth by sixty in length, reaching toward San Diego. Eastward, it merges into the San Bernardino Valley, sixty miles in length. Other smaller valleys branch off and wind through the mountains. All of these valleys are walled in upon the north by mountains from five thou-

sand to nine thousand feet high, sheltering them from the north wind. The rains and melting snows of these mountains feed many streams, which are extensively used for irrigation.

CLIMATE.

The climate is essentially that of the northern part of the State, but robbed of its cold wind and grown softer and milder. The sun, five hundred miles nearer the tropics than at San Francisco, shines with an increased fervor, but the nights are cool and the air during the day never has the intense heat of the northern interior valleys. The seasons are later by several weeks than in the Sacramento Valley. The rains hardly set fairly in before the latter part of December, while the Spring is cool and delayed. The late commencement of Winter is due to the fact that the rain current first strikes the coast far to the north and travels backward, reaching San Francisco after it does Oregon, and Los Angeles still later than San Francisco. The tardy Spring is no doubt, in part, due to the snow upon the surrounding mountains. Upon some of them the snow lies from December to June. Warm south winds and a more vertical sun prevents any excess of cold from this cause. The ripening orange at the foot of the mountain is watered by the melting snow from its crest. July, August, and September are the months of greatest heat, but the daily sea breeze and frequent night fogs are constantly equalizing the temperature. The daily average at Wilmington, the seaport of the country, is as shown by the records at the Drum Barracks: For January, 55°; February, 56° 6'; March, 56° 9'; April, 58° 6'; May, 62° 8'; June, 63° 5'; July, 71° 6'; August, 73° 2'; September, 68°; October, 66°; November, 61° 8'; December, 52° 2'. Annual rainfall is from twelve to fourteen inches. Different portions of the country develop minor peculiarities, as they may be in the direct line of the wind current or sheltered by ranges of hills.

Santa Monica and La Ballona, upon the coast, are to the system of valleys what San Francisco is to the larger valleys of the north. Here the sea breeze leaves the salt water to sweep inland. Large numbers of persons camp at these places, and fill the seaside houses during the hot months, to enjoy the bathing and the fresh, bracing air.

The Valley of the Mission San Gabriel, somewhat higher than the main Los Angeles Valley, and separated from the City of Los Angeles by a low range of hills, is, in all probability, the mildest and healthiest spot in all Southern California. Even the sea breeze is tempered and robbed of its chill before passing the barrier of the hills. Facing out towards the warm morning sun, a broad, sloping plain, commanding from all points a noble view of the low, rich lands of the Monte, and the San José Valley, with a background eighty miles away, formed of the tall peaks of the Sierras. For the invalid, the feeble, to whom cold and dampness are death, it has hardly a rival upon the Pacific Coast. Here are the choicest of all the Los Angeles orange orchards and vineyards. One hour's easy drive from the City of Los Angeles reaches the heart of the Mission Valley. Ten months more and the Southern Pacific Railroad will be finished from Los Angeles through it.

DISEASES.

The country seems free from any strongly marked endemic diseases. Upon the low lands, along the river bottoms, malarious fevers are found

during the Summer and Autumn. This is commonly either an intermittent or bilious remittent. After a wet Winter, followed by a hot Summer, cases are not uncommon in these localities of typho-malarial fever. Much of this sickness can be traced to houses built low upon the ground, without proper attention to ventilation or the circulation of air under the floor. Persons living in properly constructed houses rarely suffer. Over the greater portion of the country, however, malaria is unknown.

Cases of pure typhoid fever are rarely seen. After four years of active practice, I cannot recall a case. Dr. Edgar, after some eight years in the country, gives the same testimony. Dr. Griffin, after upwards of twenty years in the practice of his profession, says he has seldom seen a case. The same may be said of typhus.

In the same localities where typho-malarial fever is found, a tendency to inflammation of the liver, sometimes abscess, can be noticed. Tenderness of the liver is a feature of nearly all the fevers.

I have seen a number of cases of cirrhosis of the liver, with albuminuria and degeneration of the kidney, but they have been clearly traceable to the use for years of sour wines and other forms of spiritous liquors. Habit, and not climate, was here at fault.

Miasmatic neuralgias, periodic in recurrence and curable with quinine, are frequent in the same localities that furnish the fever cases. Pneumonia and bronchitis are rare.

Rheumatism, generally in a sub-acute form, is occasionally met with, but is not common. I have noticed a singular tendency to traumatic tetanus at certain seasons, especially following lacerated wounds. One case, apparently idiopathic, has come under my observation.

Phthisis, originating in the country, is, I think, very seldom found. A few deaths occur from it among the Spanish, especially where there has been a mixing of bloods with a resulting diminished vitality. The per cent of cases to population is, however, very small.

Many persons in the different stages of the disease come from abroad hoping for relief from the climate. Most of them come too late, and death is if anything hastened by the fatigue of the journey and the change from home comforts to hotel life. Persons with only a predisposition to the disease, or still in its early stages, especially if they go to the Mission Valley, or live in the region of the foothills, are often much benefited. I am satisfied that the localities mentioned offer to such persons a climate unequalled upon the coast. The warm, dry atmosphere, free from the dampness and chill of the sea, and yet near enough to be preserved from excessive heat, is far superior to the air of either Santa Barbara or San Diego. The peculiarity of the Los Angeles country is, that it is a broad, deep valley, facing upon the ocean, so that while its foothills and its interior are tempered by the sea breeze, they are still far enough from the coast for the air to become warm and dry before reaching them. The invalid or immigrant has these advantages too, while remaining in what is the center of business and population of Southern California.

Back of Los Angeles, and separated from the sea by the continuation of the Sierras, but entered through the San Gorgaria Pass, is the head of the Colorado Desert. With its heated atmosphere, almost devoid of moisture, and its hot springs, it will in the future be one of the greatest resorts for the relief of chronic rheumatism. The line of the Southern Pacific Railroad, now building from Los Angeles, runs directly across the upper end of the desert.

The well known healthfulness of the climate of Los Angeles has drawn a constant stream of the sick and infirm from the upper portion of the State, and from the East. In addition to these, the mining interior and Arizona send many of their diseased and disabled here for treatment. These facts explain a mortality that otherwise might seem too high. It is only by carefully classifying the deaths, and registering those which are the natural termination of disease brought here, that the true mortality is established. When this is done, the per cent is found to be very small.

REPORT

OF THE COMMITTEE APPOINTED JULY NINETEENTH, EIGHTEEN HUNDRED AND SEVENTY-TWO, TO INQUIRE INTO THE CAUSES OF ENDEMIC DYSENTERY IN SAN JOAQUIN VALLEY.

By F. WALTON TODD, M. D., OF STOCKTON.

The County of San Joaquin is about centrally divided by the thirty-eighth parallel of north latitude. It had, in eighteen hundred and seventy, an aggregate population of twenty-one thousand and fifty, and an area of nine hundred and sixty thousand acres of land, of which six hundred and twenty-one thousand acres is set down as arable; two hundred and sixty-four thousand as swamp and overflowed; and seventy-five thousand as mountain or hill land. Of the arable land, eighty thousand acres are of adobe soil, sixty thousand red sandy land, and sixty thousand alluvium. The remainder is not classified, but much of it lies in and along the foothills, and is a reddish loam filled with pebbles.

The watercourses are the Mokelumne, the Calaveras, the San Joaquin, Mormon, and French Camp Sloughs. These streams do not overflow their banks except in extremely wet seasons, and then they subside within a few hours after the storm has terminated which caused them to overflow. They all rise in the Sierra Nevada Mountains, and after a tortuous course of many miles through the low tule lands, find outlets by the San Joaquin River into Suisun Bay, on the northwest, except the Mokelumne, which debouches into the Sacramento. Their water is nowhere used for drinking, and very little of it for irrigating purposes. The water used for drinking is entirely obtained from wells, and is very different in quality in different parts of the county. That in the adobe lands is from wells ranging from ten to thirty feet in depth, and is hard, soon forming incrustations of carb. lime on vessels in which it is boiled. The wells in the red sandy lands are from sixteen to thirty feet deep, and the water is softer. The City of Stockton is supplied mostly from wells of from one hundred and forty to two hundred feet deep, and an artesian well one thousand feet deep. The water is soft and is found in a gravel bed, underlying a blue and yellow clay, one thousand feet below the adobe or surface soil. Throughout the valley during the Summer or Fall months, regular trade winds blow day and night from the northwest. At times these winds blow harder than at others (as the winds at San Francisco are mild or not), and these exert a very great influence in modifying the temperature, not of Stockton alone, but the surrounding country, until they have become heated by passing over the arid sand plains. The evenings and nights are consequently much cooler than the days, and the average daily difference of temperature for the month of May last, at the depot of the Central Pacific Railroad, at Stockton, was a fraction over seventeen degrees between the hours of two and nine p. m. For June it was more than sixteen and one half degrees, and for July, nearly thirteen degrees. It will thus be seen that as the season advances the extremes of temperature grow less.

For the last three years dysentery has prevailed, to quite a considerable extent, throughout San Joaquin County. In Stockton there has not only been a good deal of it, but, as will appear, it has been attended with fatal results, and has been almost entirely confined to the months of May, June, and July. I have not been able to obtain statistics for the two past years, and by no means full returns for the present, even for the City of Stockton, but I am prepared to-day to report for the months of May, June, July, and August, a total of two hundred and fifty-one cases. Of these, ninety occurred in May, eighty-five in June, fifty-five in July, and twenty-one in August. All, except sixty-three of them, were reported by Stockton physicians, and do not embrace the cases of even all the leading members of the profession. It is a startling fact that of these two hundred and fifty-one cases, thirty-three resulted fatally, being one in $7\frac{2}{3}$; twenty-five of them were children, and eight adults—the latter being mostly from the Insane Asylum, where there were fifty-two cases. My inquiries have extended to all the different tellural districts, and none seem to have been exempt. There seems to have been as many cases occurring in the rolling, sandy, and pebbly regions, as nearer the watercourses and on the black lands, and, if possible, they were the most malignant. Some of the cases occurred in houses overshadowed by vines and shade trees, having damp floors, from being near the ground, without proper ventilation underneath; while others, equally numerous and severe, have been found on the open plains, in houses high above the ground, without a tree or vine near, and with a free circulation of air beneath them; and still others have been found in houses under which there were cellars filled with fetid water. In some of the families, in both town and country, the disease has successively attacked every member—adults and children—and in one, two of the nurses suffered severe attacks.

In my investigations as to the causes which have produced this disease, in a region of country forty miles long and twenty miles wide, so diversified in its physical characteristics, candor requires me to confess that a theory framed to apply to one section has been overthrown by facts furnished by another, and a careful inquiry has failed to reveal any local cause whatever adequate to a satisfactory explanation of its prevalence. But the investigation is not altogether barren of results. It will be seen, by what has been already said, that there were very great vicissitudes of temperature at the Stockton depot between the hours of two and nine P. M., and between the latter hour and three A. M., I do not doubt it was equally as great. For the month of May, the average difference was seventeen degrees in seven hours, and during this month ninety cases are reported; for June, the difference was sixteen and a half degrees, and eighty-five cases; for July, the extremes were still less, nearly thirteen degrees, and the number of cases still less, viz: fifty-five; for August, the number of cases was only twenty-one. These seem to me to demonstrate the fact that the number of cases bear a relative proportion to the extremes of heat between the day and night; and, as this cause was operative in all parts of the county, it furnishes, to my mind, the only satisfactory solution of the question: What is the predisposing cause of dysentery in San Joaquin County?

Sir Thomas Watson, in summing up the causes of dysentery, says: "In respect to this, as to other bowel affections, a high diurnal temperature of the air appears to be the predisposing, and, exposure to cold, the exciting cause." More than one of our most intelligent physicians have expressed to me the same opinion; while others, reasoning from

effect to cause, have ascribed its prevalence to the influence of malaria. This I regard as inconclusive, for the reason that throughout our valley acute diseases of every kind observe greater or less periodicity, and demand quinine in their treatment; and then, when malaria abounds, we have almost no dysentery, as in August, September, and October. While I feel confident that the one assigned above—that is, vicissitudes of temperature—is the true predisposing cause, I am sure that we have many exciting causes, such as the imprudent indulgence of green or stale fruits, and other indigestible substances, teething, and improper clothing.

The methods of treating this formidable disease have been almost as numerous as there are different physicians. With some, it has seemed purely experimental; that of others, tentative; and, again, heroic; and some gentlemen have made their treatment conform to certain theories. One of them, to inquiries of mine upon the subject, said, "that he was in the habit of opening the treatment of his cases with a saline cathartic, in order," as he said, "to relieve the capillaries of the colon and rectum of an undue afflux of blood," and I fully recognize the wisdom of the procedure, for it must be in this way, and not by the removal of offending ingesta alone, that castor oil and rhubarb exert their salutary power. Several others, myself among the number, think that in heroic doses of ipecacuanha we have a most invaluable remedy. Of the two hundred and fifty one cases reported, I treated twenty-two, without the loss of a single case; and I ascribe this good result, in a great degree, to the use of ipecac., in doses of from five to twenty grains, according to the age of the patient, given every five hours, preceded by laudanum, and, sometimes, a mustard cataplasm. Some of these cases obstinately persisted, after a full and fair trial of the remedy—as has been the case in former years—but, it failing, a resort to castor oil and turpentine, with opium, and sometimes quinine, have accomplished what the ipecac. failed to do. The stomach soon acquires tolerance of the remedy in large doses, and I have been much surprised to find how soon alvine evacuations have followed upon its use.

There is no disease in which one should bear in mind the wise maxim, "*Nimia cura medici*," more than in the treatment of this; and, at the same time, there is none where the temptation to be constantly doing something is greater. The suffering patient, and his friends, if not the doctor, think that if only the operations were checked all would be right. They do not consider that the evacuations—a mere effect—do not constitute the disease; that a local inflammation, which may be sufficient to arouse a fearful amount of constitutional disturbance, together with the continued operation of the predisposing and exciting causes, are of paramount importance in the consideration of the case. This inflammation was formerly treated by active antiphlogistic means.

May not the high rate of mortality in San Joaquin County—one in every seven, and a fraction over—be, to some extent, due to a want of general and local bleeding? We find the anus in many of these cases pouting and patulous, and unable to retain either injections or suppositories. Surely the application of a few leeches would not come amiss under such circumstances. But against the indiscriminate use of astringents, I desire to enter a solemn protest. Their administration not only consumes valuable time, but they do a positive mischief. The fact should never be lost sight of, that the disease is inflammatory, and, to be treated successfully, must be combatted by such remedies as will subdue inflammation.

REPORT ON INTOXICATING LIQUORS.

BY HENRY GIBBONS, SEN., M. D., SAN FRANCISCO.

The Act establishing the State Board of Health, contains the following section:

“SEC. 3. It shall be the duty of the Board, and they are hereby instructed, to examine into and report what, in their best judgment, is the effect of the use of intoxicating liquor, as a beverage, upon the industry, prosperity, happiness, health, and lives of the citizens of the State; also, what legislation, if any, is necessary in the premises.”

Under this provision, it seems obligatory on the Board to present a report on the subject. My colleagues have assigned to me that duty, and I approach it with reluctance, as the magnitude and extent of the subject are too great to be properly handled in the narrow limits to which I must be confined. For this reason, I will attempt nothing more than an outline of the leading points.

FIRST.—*The effect on the industry and prosperity of the citizens.*

From statistics furnished by the Commissioners of Internal Revenue, and from other sources of information, it has been estimated that the amount paid yearly by the people of the United States for intoxicating drinks, exceeds one thousand millions of dollars. Enormous as these figures appear, they are probably within the limits of truth. Of this sum, the proportion for California is not far from twenty millions of dollars. If one third of the inhabitants of the State, that is to say, two hundred thousand persons, were each to spend thirty cents a day for liquors, the gross amount expended by them in a year would exceed twenty millions of dollars.

Much of this vast expenditure comes from the laboring classes, and is the wages of industry. It is spent for a needless luxury, to say the least. In the aggregate, it would be decidedly better for those who spend it, were it thrown into the bottom of the sea. But what if it were devoted to the comfort and welfare of their families, or invested in houses and lands? What would be the result in a single year?—And what in five or ten years? The answer to these questions will bring into view some of the effects of intoxicating liquors on the industry and prosperity of the State.

But the loss of the money is but a small portion of the evil. Loss of time, loss of place, loss of employment, loss of home, loss of character, loss of liberty, loss of health, loss of life, all follow in train. An army of strong and able men are turned from the path of industry and sobriety,

and instead of adding to the prosperity and wealth of the State, become a burden to the body politic, and a source of taxation to the commonwealth. In this young State of ours, there are probably at the present moment not less than six thousand criminals, paupers, and lunatics, in the various prisons and public institutions, who owe their degradation, misery, and ruin to intoxicating drink.

SECOND.—*The effect on the happiness of the citizens of the State.*

This is answered in part under the previous head. To dwell on it would be superfluous. One of the most eminent medical writers of Great Britain (Benjamin Parkes, M. D., F. R. S.), has declared: "If alcohol were unknown, half the sin and three fourths of the poverty and unhappiness in this world would disappear." Of all countries in the world, California stands most in need of the sanctifying influence of the ties of home and family. To what extent those ties are sundered through intemperance, is well known to every observant and feeling person.

THIRD.—*The effect on the health and lives of the citizens of the State.*

Every man who can look back through twenty years of California life, is able to bear witness to the havoc committed by strong drink in the ranks of our great men. Did I dare, I could read a long roll of names familiar to us all, of men who have been slaughtered by the demon; statesmen, jurists, professional men, men who have at once honored and disgraced the highest official stations—men of learning, of genius, of eloquence. It is painful to reflect how much the State has suffered by the loss of so many of its most valuable citizens.

In the view of many persons, the industry and prosperity of the State are greatly hindered by oppressive taxation, by increase of the cost of certain articles through the tariff, and by Chinese labor. Compare the loss sustained by these alleged grievances with that resulting directly from the purchase of intoxicating liquors. If the immense drain which flows from the pockets of the industrial classes of California for strong drinks were suspended, the aggregate saving would refund to them the total amount lost through Chinese labor and through tariff duties, and would, in addition, pay all their taxes and leave a balance large enough, by the accumulation of a few years, to purchase a homestead for every family.

It is conceded very generally by men who have given the subject their thoughtful and serious consideration, that intoxicating liquors are not necessary for persons in health; that, on the other hand, they are positively injurious; and, that their value as a medicine, to be used in sickness, is impaired or destroyed by their common use in health. They predispose to disease, instead of preventing it; and they induce and aggravate many forms of sickness, and render them more difficult of cure. They are the direct cause of a large number of deaths, and the indirect cause of a still larger number. Their noxious effects are handed down from parent to offspring, deteriorating the race in body and mind from generation to generation by the inheritance of disease and imbecility. It may be safely averred, that all other evil influences against which society seeks to protect itself, such as over-crowding, defective drainage, unwholesome food, and injurious habits in general, do not, in the

aggregate, so much disturb and destroy the public health and shorten the duration of life. Most assuredly an evil of such magnitude ought to alarm and arouse to defensive action every good citizen, every patriot, every legislator.

FOURTH.—*What legislation, if any, is necessary in the premises?*

So manifest has been the pernicious influence of strong drinks in all ages and all countries, that scarcely any civilized people of ancient or modern times has tolerated their indiscriminate sale. Human ingenuity has been tortured to contrive laws by which to restrain the traffic within given limits. It is one thing to enact laws, another to execute them; and the execution of laws on this subject appears beset with extraordinary difficulties. A business which transfers from the pockets of consumers to those of distributors upwards of a thousand millions of dollars per annum, is more likely to control legislation than to be controlled by it. The interests of the many, who sell, and the appetites of the many, who drink, form a combination too powerful to be overcome or seriously restrained either by moral or legal agencies. And yet there is a general demand for some form of legislation which will suppress the indiscriminate sale of liquors, and relieve society from a portion, at least, of the resultant evils.

An effort is on foot to induce the Legislature of California to enact a "local option" law, by which a majority of the voters of a county or district may determine by vote whether liquors shall be sold in said county or district; also, a law rendering the seller of liquor liable for damages resulting from its use. Laws of this kind are in force in some of the Atlantic States. The "local option" law involves the principle of "prohibition" to a limited extent. The advocates of prohibition complain that they are very generally misrepresented by the public press, on two points: first, by charging them with depending on the force of law for the correction of morals, and, second, by imputing to them the attempt to determine by law what man shall eat and drink.

There is nothing more unjust than the first charge. Those who aim at legislation are almost the only individuals who labor in the moral field. They do not propose to substitute law for reason and argument, but to bring it to bear where moral agencies fail. The fact is universally recognized that a large proportion of individuals who have fallen into habits of intemperance cannot be permanently reclaimed as long as they have access to the means of indulgence. Our Courts, and prisons, and hospitals, and lunatic asylums, are thronged with men and women of this class, who have lost the power of self-control, and who will never cease to be pests to society except through physical restraint. For the benefit of these persons, and their families, and for the protection of society from their vicious contamination, and from the enormous burden imposed on it by their vices, the friends of humanity, whilst they continue, as in the past, the industrious employment of moral influences on society at large, and especially on the rising generation, would invoke the aid of law to interpose the only possible remedy by depriving them of the means of indulgence.

As to the other objection urged against prohibitory legislation, that it prescribes what men shall or shall not eat or drink, the answer is that it does not, except constructively; that society has an undoubted right to prohibit the sale and distribution of anything noxious; that the most noxious of all articles of traffic is that here in question. Thus,

the law prohibits the sale of tainted meats, of immaturo veal, of the flesh of diseased animals. No one disputes this right, or attempts to shift the issue by pronouncing it a sumptuary law, which prohibits an epicure from eating such meats as he might prefer.

The question of intemperance never before attracted as much attention as at present. Nearly all civilized nations have awakened to its extent and dangers, and are devising means for its suppression. How to restrain the distribution and consumption of intoxicating drink is fast becoming the great problem of modern legislation. Men who have most studied the subject, who have labored in the field of reform, who have devoted themselves to the service of humanity, are gradually concentrating their convictions and their efforts on the principle of prohibition, as the only effectual basis of jurisprudence. Knowing that legislation is futile unless supported by public sentiment, they do not at once aim at the final purpose, but seek first to educate the people up to the proper standard, and in the meantime to secure all feasible palliative measures. It is time for legislators everywhere to contemplate the important subject.

ADULTERATION OF FOOD, DRINKS, AND DRUGS.

BY JOS. F. MONTGOMERY, M. D., SACRAMENTO.

Of the many social problems presented to the philanthropist, the scientist, the political economist, or the sanitarian, for consideration and solution, none excel in importance that of the adulteration of food, drinks, and drugs. The first of these articles is as indispensable to life as air or water, and the others, under certain conditions or circumstances, are often but little less so. This being the case, it is essential to the health of the individual, and consequently to the welfare of the nation, that all these should be pure and wholesome. A healthy, industrious, and virtuous population, possessed of a well developed physique, and ample mental and moral force, and therefore capable, under proper training and government, of accomplishing much in the way of every variety of production, constitute a nation's chief wealth; and it is, therefore, the highest duty of Government to protect its citizens, with a jealous eye and firm hand, regardless of labor or of cost, from every species of fraud, wrong, or oppression that the vicious, the selfish, or the covetous may seek to practice upon them—the scope and purpose of such duty being to restrain effectively and punish severely, at every hazard, all who may scheme and contrive to corruptly prey upon and defraud the innocent public, often even to the extent of wickedly periling both health and life, to gratify their inordinate and atrocious greed.

It is of the highest importance, indeed, that our food should be genuine and wholesome, although even against adulteration of food the robust constitution may be able to maintain its health; but should this become impaired, whether by adulteration itself, or by other causes, it is absolutely indispensable that those remedial agents, by the aid of which the healthy actions are restored, should be positively what they are represented to be. It is a hardship, truly, that the practice of adulteration should deprive a man of his health, and a greater one that the nefarious practice should render inert the remedies which would assist in restoring to him that inestimable blessing. Of what use is opium that will not allay pain, of quinine, that will not arrest fever, or of ipecacuanha, that will not vomit? And yet such drugs are sold and relied on, to the peril of life.

The commercial, physiological, and chemical aspects of this question are now pretty well understood with us, owing, among other agencies, to the researches and published works of certain British authors, some of whose publications are the only books on the subject we have been able to obtain, save a few numbers of several periodicals published in this country. From these we learn that, though science has been impressed into the service of falsification, and great ingenuity has been

displayed in the practice of such deception, yet science, in the hands of the microscopical and chemical expert, has been also, in most cases, equal to the task of detection and exposure.

It has been well remarked that of all evils which afflict us, those that are cumulative or gradual are the most dangerous, because they are insidious, and therefore less preventable, their cause being obscure. Such an evil of vast magnitude is the one before us—the adulteration of food and drugs, which, by excluding nutritive or medicinal substances, or by introducing those that are injurious, does harm both negatively and positively. When it is remembered that most of these adulterations cannot be detected with our unaided senses, but require considerable scientific knowledge, some legal protection is indispensable, especially in the case of the poor.

As an example of the universality of adulteration, I shall quote a paragraph from the work of Dr. Hassall, of Dublin, who seems to have made the subject specially his own. After giving a list of the deleterious articles used for adulteration, he says:

“It may so happen, and it doubtless does sometimes occur, that the same person, in the course of a single day, receives into his stomach some eight or ~~ten~~ of the articles above enumerated. Thus, with the potted meats, ~~and~~ fish, anchovies, red sauces, or cayenne, taken at breakfast, he would consume more or less bole Armenian, Venetian red, red lead, or even bisulphuret of mercury. At dinner, with his curry or cayenne, he would run the chances of a second dose of lead or mercury; with the pickles, bottled fruits and vegetables, he would be nearly sure to have copper administered to him; while if he partook of *bon bons* at dessert, there is no telling what number of poisonous pigments he might consume. Again, in his tea, of mixed or green, he would certainly not escape without the administration of a little Prussian blue, and it might be worse things. If he were a snuff-taker, he would be pretty sure to be putting up his nostrils from time to time small quantities of either some ferruginous earth, bichromate of potash, chromate of lead, or red lead; finally, if he indulged himself with a glass or so of grog before going to bed, he would incur the risk of having the coats of his stomach burned and irritated with the tincture of capsicum or essence of cayenne. If an invalid, his condition would be still worse; for then, in all probability, he would be deprived of much of the benefit of the skill of his physician, through the dilution and sophistication to which the remedies administered for his relief were subjected. This is no fanciful or exaggerated picture, but one based upon the results derived from the repeated analysis of different articles, as furnished to the consumer.”

As an evidence of the correctness of the foregoing picture, I will add the result of some of the observations made by reliable authorities. The following are a few of the results obtained by Professor Cameron:

Of one hundred specimens of milk examined, all contained water only as an adulteration, ranging from twenty to forty-five per cent above the natural amount. The sugars were not adulterated, but contained iron enough to blacken tea, and also the sugar mite. Coffee was found badly ground and stale in many cases. In one case a mixture sold for coffee was proved to consist of roasted wheat, cocoanut dust, and five and a half per cent of millstone grit, no coffee whatever being present. Out of eighty thousand pounds of meat examined, twenty-five thousand pounds was condemned, chiefly because it came from diseased animals.

The North British Daily Mail published an analysis of thirty-five samples of tea bought in Glasgow—only six unadulterated. All were high priced, and none of the six was a sample of green tea. One contained *no tea at all*. The adulterations were iron, plumbago, chalk, China clay, sand, Prussian blue, turmeric, indigo, starch, gypsum, catechu, gum, and leaves of various kinds, elm, oak, willow, poplar, elder, beech, hawthorn, and aloe. The retail vendors he supposed to be generally innocent. The work of adulteration is largely done in China, and is further carried on after the tea has reached Britain, chiefly by the importers and wholesale dealers.

As a striking illustration of the extreme degree to which this fraud is carried, I will cite the allusion made on a certain occasion before the National Association for the Promotion of Social Science, by Dr. Farr, to a famous lot of tea which was found to be adulterated with rice husks and straw, rice blackened with plumbago, silkworm droppings, tea leaves and maggots, iron filings, fragments of limestone, minute seeds, fragments of willow leaves, and husks. But the most startling, because the newest form of adulteration exposed recently, is that of tea, detected by Dr. Letheby, and entitled the Maloo mixture, from its resemblance to a species of tan used on the Maloo racecourse. The leaves of this delectable compound are those of exhausted tea, quite rotten, and most offensive, from the fact that in Shanghai pigs and dogs freely walk amongst the decomposed heaps. But in addition to this, the leaves of a certain willow plant are extensively introduced; and the *Food Journal* states that thirty thousand pounds worth of this wretched compound was lately on its way to England, to be manipulated and treated, or passed through certain processes, to conceal the fraud, and then sold as genuine tea. It is difficult to conceive that the depravity of man could be so profound and damning as to allow the worst of the species to perpetrate such an atrocious wrong. And yet, such things are done with impunity, and cunning rascals, because of the possession of their ill-gotten grains, are permitted, without due scrutiny, to enter decent society, therein to contaminate, more or less, those they may encounter.

These examples are taken from foreign sources, but similar may be found in this country. Indeed, from the slight investigation we have been able to make of such practices in the United States, our adulterators seem to display more ingenuity than any of their brethren abroad. In the *American Grocer*, published in New York, we find accounts of frauds practiced in canning and packing, that, at least, equal in perfidy any perpetrated elsewhere. For instance, we find that dried peas are soaked, passed through some process, and then canned and labeled "green peas," and sold as such. In consequence, consumers have given up the use of the domestic production, and pay their grocer nearly double price for a can of French peas of half the size. Thus, do these unprincipled packers strike at home industry and hazard the entire destruction of the trade in American canned peas. Again, dried corn is soaked and packed, by the same process as the peas, and sold as green corn. So, also, dried Lima beans.

The *Pharmacist and Good Health*, published in Chicago, also give examples of unscrupulous and adroit frauds. For instance, an article purporting to be neatsfoot oil contained twenty-five per cent. of kerosene or petroleum. But the most marvelous ingenuity displayed in the tricks of the wily adulterator is shown in the following instance mentioned in *Good Health*. Some persons, knowing that most ground coffee is

adulterated, never buy the ground article, but always procure the whole beans, which they either grind themselves or get ground. To meet this case, the adulterator makes up a paste of ground chiccory, pea flour, and other cheap materials, and moulds it, by machinery, into the forms of the beans. The artificial beans are rolled in a barrel until smooth, roasted to the proper color, and mixed with a small proportion of genuine beans to give them the true coffee flavor. The fraud, if suspected, can easily be detected; but this example shows strikingly the ingenuity and painstaking of the fraudulent classes, who often spend, in efforts to cheat, an amount of labor and inventive skill that, if devoted to some honest undertaking, would be certain to insure success.

It is stated somewhere that ten thousand quarts, or twenty-five hundred gallons, of swill-milk is sold daily in the upper wards of Philadelphia, a limited section only of the city. And it is well known that the large mortality of infants in our cities and towns is due, in a great measure, to this poisonous article.

Without citing other like examples that might be adduced, we are compelled to admit—both from what we learn from the authorities, and from what we discover in our daily personal experience—that the sale of unwholesome provisions, and the adulteration and deterioration of food, is a common practice. It is so common, indeed, that we are tempted to assert that it seems to have become established almost as the rule, where such a thing is practicable, rather than the exception only, as we would naturally suppose to be the case. This is manifested in the character of many of the articles of food that we purchase, even from the grocery stores of the best repute, and in the viands served to us at the tables of some of the most expensive hotels and boarding houses in the country. The meats, frequently, are rather unsavory than otherwise, and, in some instances, are absolutely offensive, whether they be fresh or cured; the butter is often distasteful and unwholesome; the bread insipid or unpleasant to the taste from staleness, impure material of which it is made, or faulty cooking; the tea is often intolerable; the coffee unrecognizable, owing to the free admixture of that abominable production, chiccory, or some other, perhaps worse, impurity; and even the milk, in this land of plenty, is diluted and depraved to such a degree as to deter consumers from its use, although, when pure, it is so acceptable to many, and is so invaluable to the feeble, the dyspeptic, or the sick—particularly the delicate or diseased infant, when deprived of or denied its natural pabulum supplied by the human breast. This is truly a monstrous, an inhuman, a disgraceful evil that should no longer be tolerated, but should by all means be abated.

As some evidence of the correctness, in many cases, of the statements or representations made, it may be added that unquestioned evidence is at hand to show that the following adulterations have been detected here: Cream of tartar is adulterated with one fourth part of white earth, and thus adulterated it is extensively employed as an ingredient in bread. Carbonate of ammonia is added to sour flour to conceal its bad quality, and alum is added to render bread light and fair. Sand is often met with in brown sugar. Ground coffee, besides containing a large percentage of chiccory, contains also the flour of roasted beans and barley. A lot of tea, lately imported from China, contained the paper of that country, reduced to fine particles and colored with a solution of a salt of copper. The bogus or sham butter, termed "oleomargarine," which has already been manufactured in San Francisco, is now manu-

factured chiefly of beef suet and sour milk, and, by careful management, is rendered tolerant, though not agreeable, to the taste; but the probability is, that after establishing for it some favorable reputation, the manufacturer will not scruple to employ any cheap or refuse grease, however foul, as a substitute for the suet of the cow, and thus impose upon the public a wicked and revolting fraud. Butter, when rancid, of a pale color, and really unfit for use, has its appearance and flavor improved by the addition of an article termed "annatto," which, in a crude or unmixed state, is most disgusting to look upon. The several powders manufactured and sold as a substitute for eggs, or as "concentrated egg," are found to have a very injurious effect upon the digestive organs. Many of the bottled pickles are kept in vinegar made chiefly of sulphuric acid, as the leading ingredient, with verdigris, acetate of copper, an active poison, added, to impart to them a beautiful green color. The usual trick of the milkmen is to add a mixture of chalk and water to increase the bulk of their stock; and some liquors are adulterated with acetic acid, various ethers, and other articles of like nature, besides strychnine, according to the fancy of the manufacturer.

We may repeat, or assume further, that the evil here being treated is so widespread as to be almost universal in its operation; that it is sadly injurious to the health of the people, entailing upon them the horrors of dyspepsia, the ordinary acute and chronic troubles of the digestive organs, and even the development of scrofulous and tubercular diseases, owing to the debility, wasting, and general impairment of vital force, resulting from inadequate nourishment.

Now, it being established that this practice is clearly fraudulent, and in many ways detrimental, and it being shown, also, that it is capable, as a rule, of being discovered by means already alluded to, it remains for us to inquire why it is that in these days of advancement it still exists as heretofore, and why it is not suppressed? Laws thus far have been defective, and too much apathy and indifference have existed in the public mind, partly from ignorance and partly from the vague idea each one has that he is less mortal than his neighbor, and therefore does not take the danger home to himself.

"There would be doubtless more interest felt," says Mr. Phillips Bevan, "if the people would but take the trouble to reflect what adulteration of our food means. It does not end with an unpleasant taste or an unappetizing meal; it is far beyond that; it means the gradual poisoning of the people, the lowering of the physique of a whole nation, the stunting of our growth, the rapid deterioration of our constitution; while morally, it means a daily and constant fraud, practiced by the seller on the buyer; a cheating which, begun with the smallest trifle, soon makes it so callous that it is applied with equally comfortable conscience to things of greater importance. In fact, it is one of those insidious sapings of a nation's honesty, of which we have, unfortunately, learnt of late years to make so light. Like the camel, the English nation bears a good deal, and is even persuaded that it likes it; and perhaps nothing shows the difficulty of dealing with such a question as this, that not only is the Government slow to move in the matter, but there are even men in high places who are more ready to defend the system than to condemn it, by saying that it is not so bad as it might be; that the principles of free trade will apply to this as well as to other things; that the buyer must look to himself, and so on. But free trade was never intended to apply to any system which has untruth stamped upon it, and it is the first duty of Government to protect its people in every

possible way. Another and more plausible argument is, that adulteration arises from the fault of the people themselves, who will persist in buying the cheapest articles, so cheap, indeed, that everybody knows that they cannot be real, or good, for the money. But in answer to this, I would say, that though the people do seek to buy in the cheapest market, they do so in ignorance of the character of the goods, and under the conviction that they are what they are represented to be, and I feel certain that, if in some Utopian fit of honesty, the vendors were to label their goods with a true description of their composition, the buyers would have no more of them, cheap as they are. And were there a certainty of detection and punishment, we should find that the sellers of adulterated goods would be very careful how they offered them. We should find, also, that the mutual relations between the seller and the consumer would soon be on a better footing, and nobody would be poorer, while the sanitary condition of the community would be unspeakably benefited. As a sanitary question, indeed, the purity of our food has been strikingly overlooked. No commission, or inquiry, or machinery embracing sanitary subjects can do its work properly without embracing the food question. It is as absolutely necessary as to give us fresh air, good drainage, pure water, or any other sanitary blessing: for what is the use of these if, side by side, we allow of the administration of poison?"

In the discussion that followed the reading of the paper of which the foregoing is an extract, Mr. Rawlinson stated that there was no town where there were not some persons who dealt in meat that was entirely unfit for human food. They bought unsound meat at small price; they bought cows which had died of milk fever, and calves that were not fit for food of any kind.

Mr. Godwin remarked that trade morality throughout England was only very indifferent, and in this observation he included all classes. He would have all such sophisticated beings punished so severely that they would not attempt to repeat their dodges again.

The Mayor of Newcastle said, ordinary people who had not given the question their consideration, could not have the slightest conception of the adulteration carried on in different trades, and he had little doubt that many present were like himself, perfectly astounded at the statements which had been made.

Mr. Sarjeant Cox said there were two questions, namely: What law could meet the difficulty, and how could it be enforced? As a man of experience, in the administration of the law, he believed the only solution of the difficulties was to be found in the destruction of all adulterated articles when discovered, and he argued that this would be more efficacious in procuring the desired end, than making any elaborate law, and the infliction of severe punishment.

Dr. Stevenson McAdam said, on one occasion, he tested some flour and found it contained twenty-five per cent of chalk; and, on another, he analysed a bottle of port wine, and found it to be strongly adulterated with logwood and cane sugar instead of grape sugar.

Mr. P. H. Holland contended that in all cases it was the business and imperative duty of tradesmen to see that their weights and measures were according to the standard. If the latter condition were not complied with, the offenders were fined; and why not enforce a penalty on the seller of adulterated articles; the two cases were analogous.

Mr. John Hancock remarked that summary punishment was necessary, without the chance of procrastination by appeal.

These quotations are made to give an insight into the views of the eminent men, who have paid special attention to this interesting subject, that we may profit by their experience, for the evils portrayed as existing elsewhere, exist here also, and the same laws found to be most effective in one latitude or country would prove alike so in another, suitable allowances and modifications being made to adapt them to the peculiar needs or circumstances of any particular region or community.

In modern times, or of late years, the laws have been too lax and lenient to deter the unscrupulous and sordid from the commission of these acts, and such have, for a long time, preyed at will upon the general public, without check or hindrance, until the evils have become well-nigh intolerable; and the heretofore patient, submissive, careless people have at last given indications of impatience, and are beginning to consider their real condition, and to demand suitable redress of their grievances and wrongs. At this crisis, it is well, therefore, that some more attention should be paid here to the public health, and measures be taken to insure wholesome supplies of food and drink, and pure drugs, to all ages, classes, and conditions of the population.

In olden time, in London and elsewhere, it is related by Letheby, remedies for the misdemeanors alluded to were quick and effectual. For example, there were strict regulations concerning the manner in which the business of the baker was to be conducted, and in default, he was drawn through the streets upon a hurdle, with the faulty loaf hanging from his neck; and for a second offense, he was drawn in the same manner, and then placed in the pillory. A like punishment was awarded to butchers and vintners for fraudulent dealings; and an instance is related of a butcher who was drawn through the streets for selling measly bacon, and then set in the pillory with two large pieces of his measly meat over his head, and a writing, which set forth his crimes. Many cases were recorded where the pillory or the thew were awarded for selling putrid meat, fish, or poultry, or for the unlawful dealings of bakers, vintners, or wine drawers.

Anything and everything necessary to eradicate these heinous crimes, and deter the infamous robbers and murderers from prosecuting further their nefarious trade, we claim would be fully justifiable. Of a verity, we have degenerated sadly in these respects, so that now such practices are committed with impunity, and go unnoticed and unpunished. Better far, we will repeat, for the health and general welfare of the public, that we should revive the rude penal remedies of our long ago fathers, since it is recorded that they were effective in arresting the wicked and diabolical evils they were designed to cure, than that they should be longer endured to our incalculable injury.

Laws thus far, as a general thing, have been defective in this, that they are permissive, and leave it to the purchaser or consumer to complain and pay a fee for analysis, etc., instead of appointing officers whose special duty it shall be to take action in seizing and examining any article he may suspect, or have reason to suppose, to be impure; his compensation being paid out of the public treasury, the burden upon which may be lightened by the fines and penalties imposed on the guilty parties detected in their fraudulent practices.

Dr. Hassall defines adulteration thus: "It consists in the intentional addition to an article, for the purposes of gain or deception, of any sub-

stance or substances the presence of which is not acknowledged in the name under which the article is sold."

It seems to have been established or accepted as best, where the test has been made, that an officer should be appointed, skilled both as a microscopist and analyst, who should have no private *animus*, and that he should go around and examine samples, selecting them at random, and if he find anything wrong, to make the fact known.

Mr. Bevan stated that in Galveston strong public opinion had been created against adulteration, so that the reputation of the dealer was thought more of than the penalty. In Georgia, the laws were very severe, and the knowledge that the penalties would be inflicted acted preventively. In Leipsic, there were general complaints that the laws were not enforced; the cause of this being that it was everybody's business, and consequently, nobody's. In Prussia, the laws were very severe and very seldom violated. These very few words showed whether the law was being actively worked or not. The great obstacle, in many instances, in the way of carrying out the law, was sympathy for the tradesman; but he was sure a strict enforcement of the statute would create a purer state of public opinion. The custom in France is, to seize the adulterated article, to fine and imprison the offender, to close his shop during the imprisonment, and to publish on his own shutters his name, offense, and punishment. A few cases of this sort would be highly calculated, anywhere, to put a stop to adulteration.

Looking to the enormity of the offense, Mr. Postage contended that the adulteration of food, drink, and drugs ought to be felony, and knowingly selling adulterated food and drugs a misdemeanor. The following propositions contain, in his opinion, the remedy for adulteration, by: First—Making it an offense punishable by fine and imprisonment. Second—By the compulsory appointment of analysts, to whom the inspectors, the public, and traders could refer articles for examination and analysis. Third—The suppression by those officers, to commence with, of poisons and injurious adulteration of food and drink, and the adulteration of drugs. Fourth—By the use of a staff of inspectors to receive the articles and to institute proceedings before the magistrates on receiving reports of detected adulteration. Fifth—by giving further and summary jurisdiction to the magistrates in all cases of trade frauds. Sixth—By the appointment of Government Commissioners to assist the local authorities in carrying out and enforcing the proposed law against adulteration. Seventh—By the inspection of manufactories for the detection of the adulteration, and the punishment of the offenders. Eighth—By keeping the public informed of the nature and character of the adulteration practiced in food, drink, and drugs, by publicly reading the quarterly reports of the public analyst before the corporations and other authorities appointing them. Ninth—By the seizure of all pernicious and poisonous admixtures and ingredients used in the adulteration of food, drinks, or drugs found on the premises of the adulterators. The intention of the adulterator was clear enough—it was to deceive and to defraud. Let, then, the punishment be clear, decided, and adequate. Fines were of small use in such a matter; imprisonment alone would deter respectable criminals from a practice which leads rapidly to ill-gotten wealth.

The result of the operation of these laws, after testing and amending them for years, although still defective, has been, we find, so clearly beneficial as to encourage earnest perseverance in perfecting and enforcing such measures everywhere.

We have not been able, as yet, after diligent effort, to obtain a copy of any law, touching this evil, enacted in any of the countries from whence information relating to this subject has reached us; but it is still our purpose to obtain, if practicable, such copies in time to frame a bill of similar character, to be presented to the next Legislature. But should we fail in this effort, still such hints and suggestions may be gathered from this paper as may be sufficient to enable a skillful draftsman of bills to frame one to meet the requirements of our condition, and to correct the wrongs about which we have said so much.

ANIMAL FOOD.

[TRANSLATED FROM THE GERMAN, BY L. C. LANE, M. D., SAN FRANCISCO.]

With the exception of milk and its derivatives, butter and cheese, and the eggs of poultry, all articles of nourishment derived from the animal kingdom are included under this head.

The subject interests us in the following respects:

- (A)—In regard to the *quantity* of disposable raw material;
- (B)—In regard to the *quality* of the same;
- (C)—In regard to the nature of the method of its preservation;
- (D)—In regard to its preparation and preservation for the market.

(A)—*Is the disposable quantity of animal food indeed a matter of interest to us?*

According to all observation, animal food is not indispensable to human existence. Thousands of mankind, who have but seldom partaken of animal food, have, nevertheless, enjoyed their full bodily powers, and reached an advanced age. The human organism is able to extract nutriment from articles of animal food, as well, also, as from nourishing articles different in nature. It is adapted to the consumption of *various* nutritive articles, but it is not to be inferred hence that *all* these means of nourishment, both animal and other food, are necessary to the support of the human body. It is, however, apparently as little to be doubted that the use of animal food is a means of increasing, in every respect, the active bodily powers of man. By the mixing of animal food in the alimentary substances, the muscles and brain receive increased power of activity, and are rendered capable of greater resistance to many morbid influences. Hence, it is well worth while to provide man with animal food.

What quantity of such food is needed by man in order that he may reach the highest degree of active power, and whether he should partake daily of such nourishment, depends wholly upon the individual. With many it suffices apparently to enjoy, according to the appetite, animal food a few times during the week; others, in order to attain to the highest degree of active power of which they are capable, should partake of it every day; still others, several times a day.

The increasing of the functional powers of the muscles and brain is, moreover, in itself a matter which concerns us most nearly. Increased muscular and brain power gives a greater measure of the requisites of normal life than an inferior degree of functional power of the muscles and brain; and still nearer does the increased power of resistance to certain morbid influences concern us.

Thus animal food, considered in its relative quantity to the population, is indisputably a matter of interest to us. There is no difficulty in perceiving the numerous influences controlling the quantity of disposable animal food among any certain population; hence, I will not enter upon an enumeration and estimation of them, but will only call attention to a few points in regard thereto.

The amount of disposable material becomes here and there greatly influenced by unapparent causes; in certain districts of Africa beeves cannot be kept, on account of a native fly which quickly kills them (Livingstone); as cities increase in number, the production of swine diminishes. The greater the number of species of animals, which a certain extent of country produces for the nourishment of man, and the more equal the total weights of the different species, so much less is the influence of epizootic diseases in diminishing the quantity of animal food. An epizootic pestilence usually attacks but *one* species of animals, and the loss consequent thereon is much less felt if the above relative proportion of the different species is maintained. With reference to this, it were by no means undesirable to overcome the widespread repugnance to the use of certain animals (horse, etc.,) as food.

The occasional practice among the poor of cities of raising goats, swine, etc., undoubtedly might be encouraged so as to increase the quantity of disposable material for animal food, did not the keeping of them produce infectious influences in the air and in their dwellings.

A knowledge of the principles of the rational theory of stock raising and of rational husbandry, particularly in regard to pasture lands, is, as yet, not widespread; everything tending to the diffusion of this knowledge, effects an increase in the quantity of animal food.

The refuse from many industrial establishments, and also animal waste matter conducted into larger or smaller watercourses, by causing the death of immense quantities of fish, is detrimental to the recent efforts made to increase the amount of animal food by artificial breeding of fish and rational pisciculture.

Different districts vary in their productive resources in regard to animal food; hence there must be the freest possible transportation of the total amount of animal food produced, in order to equalize superfluity and want. Whatever favors the interchange of this material is of public sanatory value.

But this transportation of animal food from one district to another, especially when represented by trade in live stock, has the disadvantage of spreading the contagious diseases of the animals transported—in particular, the cattle-plague and the lung diseases of neat cattle. The preventives to be opposed to this spread of disease by trade in stock, are quarantine, non-importation, etc. Such means of prevention are of the greatest importance, although they tend to interfere with the general supply of animal food. From this point of view, it were most desirable that the export and import of animal food should consist of slaughtered animals only.

Many territories, for instance South America and many parts of Africa, have heretofore exported but a very small quantity of their best animal food, for the reason that the transportation of live stock is not admissible, and the manner in which the slaughtered material is preserved is, thus far, unsatisfactory. Every advance in this latter direction is also an advance in the interest of the public health.

(B)—In regard to the *quality* of animal food, two points are of interest:

1. That it be derived from the greatest possible variety of species;
2. That it be perfectly innoxious.

1. The muscles, brain, spinal marrow, and the substance of the nerves, blood-vessels, and many other parts of the animal, apparently do not essentially differ in their chemical composition; the same is not the case with the blood and the organs of secretion, the former of which is a constituent of different parts of animal food, and the latter are eaten as separate articles of food. It is evident, that, by the continued use of but one species or one kind of animal as food, it is possible to collect in our blood specific substances of a certain kind, which, in their aggregate, may be of ætiological importance, either from the inability of the organs of secretion to carry them away, or in some other manner. It may be that certain diseases or tendencies result from the exclusive or predominant use of fish, pork, etc., as food. As the use of the *different parts* of the animal counteracts such effect, so also does the use of *different animals*. Such change we make instinctively, where possible, varying the animal; partaking one day of mutton, the next of beef, again of game, etc.: the same change of parts, no one caring to partake day after day of liver only, kidney, or brain. We are least apt to tire of the muscular parts, which offer the least specific differences.

2. Animal food may acquire noxious qualities for man in the following respects:

(a) It may become chemically noxious through matters *developed* in the animal while alive;

(b) It may become chemically noxious through poisonous matters *introduced* into the animal while alive through poison, food, or other means;

(c) Noxious chemical changes may take place in the animal substance after the death of the animal;

(d) Through parasites attached to the animal substance;

(e) Through certain diseases of the animal in which, as yet, no parasites have been detected;

(f) Through insects which have alighted on the meat.

(a) There are many animals whose flesh, as food for man, has always proved itself poisonous. In regard to the special chemical conditions, nothing has been learned, and but little in regard to the localization of the poison in certain parts, and other important particulars, and this in regard to but few animals; for instance, sucking animals, fish, and invertebrates. In the expedition of Capt. John Ross to the North Pole, the crew of the ship *Victory*, after eating of the *ursus maritimus*, suffered for three or four days from severe headache and desquamation on face, hands, and arms. In Perry's expedition, desquamation also followed the eating of this meat. The Esquimaux eat it without harm, but throw away the liver. The use of the *canis lagobus* as food, also produces an abnormal condition.

The poisonous influence of certain fishes, crustacean and mollusks, often arises from chemical changes in the animal *after death*; in some cases they may have partaken, as food, of substances poisonous to man; in other cases, disease, or certain physiological conditions, as the spawn-

ing period, may have produced poisonous matters. Again, many fishes seem to be always poisonous, and it is often the case that the principal part or all of the poisonous matter is found in the intestinal canal, liver, or eggs. Eels, trout, salmon, and other fish in common use as food, are said to have frequently proved poisonous; the poison in such cases being referred to the keeping of the animals in slime, or to noxious food.

Shell fish have often produced illness, even when cooked. In these, also, this may have been the result of chemical changes after death, of the feeding on noxious substances, disease, or the periodical development of poisonous matter; but in many, the poison may have been present in their normal condition. Of the crustaceans, the *cancer Bernhardus L.* is condemned as food. The *sea tortoise* has also been known to poison.

With many persons, these poisonous articles of nutriment have little or no effect, while with others, they never fail to affect powerfully; on the other hand, there are many which are equally poisonous to all persons. The phenomena resulting from noxious animal food, have always certain features in common, as desquamation, exanthema of the epidermis, etc.; here we have, it may be, under observation, a poisonous fatty matter rather than any other substances. Shell fish have also been found to contain copper, sometimes in considerable quantities; but the ill effects cannot be referred to it alone.

There is no means of proving the noxiousness of fishes or invertebrates, when this does not arise from uncleanness, but by making a trial of them as food for man. It by no means follows that the same substances would have the same effect upon carnivora that might be selected for the experiment, as they would have upon man. Although many of the substances comprised under the head of fish poison are acrid, this is by no means always the case, and hence testing the prepared fish with the lips is not always sufficient; still, it is one of the methods to be recommended. Neither are we to understand Chevallier and Duchesne's method a sufficient proof. They recommend applying a piece of the liver to the lips; but it is by no means certain that the liver is always the only poisonous part. In order to destroy the poison (which thus far has escaped detection), these authors recommend that the viscera be carefully removed, and that salt and pepper then be strewn over the fish, which should also be moistened with lemon juice, and then be allowed to stand four or five hours before cooking; the latter particular appears quite unnecessary. Since the organs of secretion seem especially to favor the accumulation of the substances here spoken of, and which are supposed to be different in different fishes, the careful removal of the viscera, and the washing out of the inside of the fish, are especially advisable; perhaps, also, the taking off of the skin.

It is the duty of the officers in charge of the public health to take measures to prevent poisoning from fish, shell-fish, and crustacea, both by inspection of the markets and by warning the public that above all things they should avoid old or putrid fish. There is great need of general and searching investigations in regard to this poison. For the protection of seafaring people, who are liable to eat unknown fish of distant localities, a knowledge of those that are poisonous should be spread by means of pictures of such.

(b) *The retention of poisonous matters* in the solid or fluid parts of animals used as food for man, is a subject whose importance to us has heretofore been overlooked. We have here to do with arsenic, lead, mercury, tobacco, opium, and strychnia. It is known that poisonous

substances, partaken of by animals, pass quickly into the milk; that honey even may be poisonous from the poison which the bees have fed on.

In regard to arsenic, Hertwig, after experimenting on beeves, sheep, goats, horses, dogs, rabbits, and birds, has drawn the following conclusions:

1. That by the administration, for medical purposes, of large or even moderate doses of arsenic to animals destined for slaughter, there results poisoning of the flesh and the milk.

2. That the poisoned condition dates from soon after the time when it is first administered, and extends over a period not yet ascertained with sufficient accuracy, but certainly to two or three weeks after the cessation of its use.

3. That by partaking of such poisoned flesh and milk, it is highly probable that unhealthy conditions may be introduced into the human system.

According to Danger and Flandin, the arsenic is not completely eliminated till the thirty-third day after its use. But undoubtedly the *species* of the animal, its *condition of health*, the *amount* of arsenic administered, and many other particulars, have here to be taken into account.

It would seem that the *external* use of arsenic assumes the most importance, as here we generally meet with the largest doses; its external use is for mange and lice. The use of large quantities of *mercury* in the curative treatment of animals to be slaughtered, would also seem to be no matter of indifference; here, too, its external use demands our especial attention, particularly the gray ointment used in such large quantities for destroying lice and other cutaneous parasites. In order, on the one hand, to avoid poisoning the meat, and, on the other, to avoid injury to the living animal, it is recommended that the owners of cattle and those who treat them medically, should be instructed in regard to the superfluous use of arsenic for the destruction of the parasites, and that very minute quantities of mercury are sufficient for this purpose; that even in using the common gray mercurial ointment, proportionally large quantities are not necessary, but that the latter might be mixed with from ten to twenty times its bulk of fat without losing its effect. Moreover, mercury is not needed in such cases; creosote, insect powder, offensive oils, suffice for their eradication. The poison may also collect in those organs especially rich in blood, and in the different secretory organs, so that the eating of these portions (liver, etc.) is particularly noxious.

The feeding of swine with putrid meat is another source of poison.

In some places, substances which might render the fish noxious as food, are used in catching fish; such as *menispermum cocculus*, *delphinium staphisagria*, *veratr. sabadill.*, *taxus baccat.*, etc. The public should be instructed in this matter, and laws forbidding their use be enacted.

As an instance of occasional impregnation of an animal used for human food with important foreign matters, that of the oyster with copper presents itself. According to the investigations of Ferrand, oysters impregnated with copper are not always green, nor do green oysters always derive their coloring from copper, but this color in oysters free from copper, is supposed to be derived from the algæ and infusoria of the water. Many oysters impregnated with copper are of a normal whiteness when the shell is opened, and become more or less colored

only on coming in contact with the air; others continue to retain their normal color. Oysters deriving their green color from the presence of copper, give it out in a dilute acid, thus being easily detected. Oysters of a normal color, and containing copper, will exhibit, under the microscope, by the addition of ferrocyanide of potassium, the usual reaction, especially if they be cut open. There is oftentimes a very considerable amount of copper. Ferrand found in a colored oyster, weighing 4.5 grammes, 12 milligrammes of oxide of copper (9 milligrammes of metallic copper.) The disagreeable taste of such oysters prevents their being eaten in dangerous quantities. In the cases examined by Ferrand, the copper with which the oysters were impregnated was supposed to have been derived from copper contained in the water from which the oysters were taken; the water received its impregnation from the drainage of copper mines and from copper-bearing mountain ledges.

Poisonous substances intended for the extermination of mice, rats, and field-mice, are, now and then, devoured by partridges, or by domestic fowls; these, dying from the effects therefrom, have been eaten by man with injurious consequences. Hence, the forbidding of exposing poisoned food where it may be picked up by birds or fowls.

(c) That putrid animal substances may be detrimental to health, is a fact not to be disputed. Is it necessary to protect the public against such substances, particularly putrid meat? Apparently not, for every one is able to distinguish fresh meat from spoiled meat. Neither does it seem necessary to warn the public against eating such meat. Moreover, in regard to game, some choose that it shall not be exactly fresh, preferring a certain degree of decay, and this is not injurious to a person in health; and it would also be impossible to fix the degree of decay allowable in material exposed for sale.

Certainly this question might be raised in regard to *prepared* meats, especially sausages, the contents of which the purchaser cannot smell; in fact we may be somewhat certain that now and then this article of food will contain meat that is not otherwise salable; moreover, the quality of such is concealed by the admixture of fresh meat and various spices. But, in regard to sausages, it is impossible to make any successful regulations; it is useless to attempt to exercise control in regard to the meat used in their manufacture, and if spoiled meat be found in them it is always easy to say that it was fresh enough when put in. The best means to avoid being deceived or injured by sausages is to avoid their use altogether. Later in this article the poison peculiar to sausages will be noticed.

(d) Among the parasites of animal food found to be dangerous to man, the *trichina spiralis*, and *tapeworm*, in different stages of development, are to be noticed. (There are other species of trichinæ which have not, as yet, demanded our attention). The trichina assails us only in pork, since we do not eat other animals in which it is found, viz., the rat, mouse, cat, fox, etc. It has not yet been fully decided what protective measures against infection from trichinæ are best, the greatest difference of opinion being in regard to the microscopical examination of pork, which some would make obligatory, others not. Delaying the discussion of this point, let us first recount other precautionary measures, remarking that I take it for granted that my readers are acquainted with the natural history of the *trichina spiralis*, and hence I need not recount the philosophical principles on which the following rules, recommended as precautionary, are founded; premising only that I accept the opinion

that intestinal trichinæ in the digestive canal of an animal may produce a different infection from the trichina of the muscles.

1. It is desirable to spread such a knowledge of the danger of the trichina that every one will refrain from eating pork, or any of its preparations, if he is not certain that it contains no trichina, or only such as are no longer alive. This, of course, can only be effected by suitably instructing the public.

2. Those who set public tables—as in hotels, boarding-houses, prisons, etc.—should be held responsible that they place on said tables no pork containing living trichina. The proprietors of such tables would then be careful to procure such meat as is thus warranted and so marked, or themselves subject it to microscopical examination, or take good care that it be sufficiently cooked.

3. We should endeavor to establish such regulations that all valueless dead animals, that *may* contain trichina (rats, mice, etc.), and further, all animals that are *known* to contain trichina, together with their excrements, hide, hair, etc., be so disposed of that other animals—swine in particular—cannot become infected therefrom; and that foxes, cats, martens, and polecats, which, as well as rats and mice, may become infected with trichina, be disposed of in the same way after the removal of their skins.

4. We should also seek to establish such regulations that, in so far as possible, swine be prevented from obtaining food containing trichina, viz.: rats, mice, cats, the excrement from human beings, swine or dogs, or the intestines or infected waste from swine, etc.

5. Every case of trichinosis, either in man or in swine, should be brought to the notice of the officers of public health, that its origin may be sought out and its spread prevented.

6. Meat containing living trichina, and not needed for purposes of instruction or investigation, should be destroyed, or so disposed of that infection from it be prevented. Scientific studies of the trichina should be so conducted as not to become the starting point of accidental infection. The possessor of meat thus infected, should be held liable by law for any evil proceeding therefrom. The attention of the less intelligent part of the community should be drawn to this. Animals have sometimes been fed with trichinous meat as a matter of mere curiosity; the danger of this should be decidedly opposed by law.

7. We should seek to bring such influence to bear as to insure that all pork, in which there is any doubt in regard to the absence of trichina, should never be eaten uncooked, and should be so prepared for eating that any trichina present must necessarily be killed by the thorough heating of the meat. The drying or strong salting of meat, divided into small portions, also destroys trichina, but neither preparation makes a very palatable dish. According to Gerlach, heating to a temperature of over 45° R., is sufficient to destroy life in the trichina. The public should also be taught that it is difficult, in the boiling or roasting of large pieces of meat, to permeate the inner part with a sufficient degree of heat, and that it is better to cut it into pieces of from half an inch to an inch in thickness, in order sufficiently to heat it. The change of color throughout, and in every part of the meat, from that of blood to that of well cooked meat, can be taken as evidence of its having been heated to a sufficient degree; the color of cooked meat results from the decomposition of the blood globules, which takes place at 65° C.; hence, this color does not indicate that the meat has been heated to the boiling point.

8. What is the most suitable disposition to be made of meat infected with the trichina or of suspected material?

Where the quantity is small, it is best to burn it; larger quantities may be cut up, and then moistened with dilute sulphuric acid, and after the total destruction of the organic life, it may then be buried in heaps of compost; in still other instances it may be best to pour strong smelling petroleum upon it, and then bury it at least three or four feet deep in the earth.

Next arises the question whether the microscopic examination of the pork to be used for food shall be made obligatory by law. If only such pork be eaten as has been previously subjected to a degree of heat sufficient to destroy life in any trichinæ that may be present, strictly avoiding all other, there is complete security against infection from trichinæ. This would forbid the eating of raw ham and some other preparations of pork. To impress upon the mind of the public the fatal result of this disease, and the means of security against it, would seem a sufficient safeguard; but while those who live in their own homes can exercise a supervision over the proper preparation of food, the interest of those who frequent restaurants and other public tables, and of course cannot rely upon the meat in question having been submitted to the required degree of heat, demands that the microscopic examination of all pork intended to be consumed by man, shall be made obligatory by law.

Against this conclusion it may be urged that it is enough to acquaint beings gifted with reason with a threatened danger, and the means, requiring no great sacrifice, of protection against it, adding in certain cases a degree of legal responsibility; and that to those who then disregard such precautions, the matter shall be left as their own private interest.

But setting aside this view of the subject, and thinking of establishing as many protective regulations as possible, such measures are beset with difficulties.

Microscopic examination of pork may become a general practice by imposing a heavy fine upon those who offer for sale pork in any form, raw, smoked, or pickled, that is not warranted free from living trichina. This, however, would tend to the complicating of penal regulations in regard to meat, since justice would require distinct regulations in regard to poisonous meat and that infected with trichina, the latter being poisonous in certain cases only, while the former, that containing arsenic, for example, remains poisonous, however carefully cooked. It would be easy to make the practice of microscopic examination general, the dealers themselves finding it for their interest to encourage it; but against such a general law arise two objections: First—The question whether the responsibility can, by right, be laid upon the dealer who but offers his goods for sale without guarantee. The public hold in their own hands the means of destroying all source of danger; why then render the dealer accountable? Secondly—Such a law would make it the duty of the Government to provide for the most careful examination of meat, and this in all places and at all times. In cities and large towns this would offer no difficulty, but where the population is more sparse and scattered, the difficulties attending would be insurmountable. Thus this would be a law which on the one side is wanting in justice, and on the other is sometimes and in some places impracticable; and hence a general compulsory law imposing upon dealers microscopic examination of pork, could not properly be established.

Again, the presence of living trichinæ having been detected by the microscope, the questions arise whether any distinction is to be made

between a greater or less degree of infection; whether certain parts of the animal—not the normal site of the infection—may be safely used as food, and whether the individual shall suffer the loss consequent upon the condemnation of the animal, or whether he shall be reimbursed from the public treasury?

Before proceeding now to the consideration of the danger threatened by the presence in animal food of tapeworms, in their developed and undeveloped stages, it is well to draw attention to some general facts:

The number of the parasitic entozoa finding the sphere of their existence within the human body, has not yet been accurately ascertained, even in regard to the inhabitants of the most highly civilized districts. Trichinosis was first recognized by Zenker, near the close of the year eighteen hundred and fifty-nine. The manner in which entozoa find entrance into the human body, is, as yet, for the most part, concealed in the greatest obscurity. Hence, there can be no complete sanatory regulations in regard to such parasites. Nevertheless, the rapid increase in some districts of such cases, the severe and often fatal illness consequent upon the presence of hydatids and trematodes in the vital organs, demand exhaustive investigation.

Many entozoa find accidental entrance into the human body through animal food; they attach themselves to the external surface, as they might to other articles of food; others find entrance through minute animals which we eat unintentionally; with fresh vegetables, salad, fruit, and other things, we may involuntarily swallow small snails or slugs—these may thus chance to introduce trematodes. In regard to some other entozoa, it is probable, though not yet proved, that they are introduced through the species of animal food in which they find their natural existence; for instance, the entozoon, said to be peculiar to salmon. Others find still different modes of entrance, as in animal food and water in which the entozoic germs are floating. Others, in the consumption of the meat of other animals than those to which they are peculiar; for instance, beef may become infected from measles pork, through the medium of the chopping block of the butcher. Thus, we perceive the difficulties attending the combating of these parasites. The poorer and the less civilized a population is, and the more intimate its relations with animals that harbor entozoa, and the more numerous these animals, so much more frequent the opportunity for human infection; thus, among the Icelanders, in consequence of the great number of their dogs and their intimate relations with the latter, frightfully great numbers fall victims to the echinococcus, which originates from the *taenia echinocc.* of their dogs, which these in turn derive from swallowing the echinocci of beef.

Sanitary regulations have already done much for the destruction of the parasites mentioned. With the progress of scientific investigation much more will thus be effected, but never all that can be done or that is necessary to do; a large part of such preventive measures must always be the care of individuals; but here there is often need of an essential improvement in condition and culture. So long as sanitary regulations are unaided by individual effort, the former will in many respects be fruitless.

If the ingestion of living hydatids, which transform themselves into tapeworms, be prevented, we guard not only against the attack of the latter, but against the possibility of the appearance of the second generation of hydatids in the same individual. The hydatid stage of some tapeworms may exist in the same animal that is adapted to the mainte-

nance of the life of the tapeworm stage; and hence, if the eggs of a tapeworm existing within a human being enter the stomach of the individual and the embryos there escape, the person becomes infected with the animal in the hydatid stage of development; that is, an individual, within whom a tapeworm exists, may infect himself with the entozoic cyst. The danger from this infection is doubtless greater than the suffering from the tapeworm; parasites in the higher organs cause severe illness and death. Thus, when we combat the ingestion of parasitic larvæ, we work against the development of the tapeworm, and, at the same time, against self-infection with the embryos of the latter.

Aside from the self-infection with the entozoic cyst, infection may also result from the ingestion of tapeworm eggs capable of being developed—the latter may be free or still contained within the proglottides—into the muscles, intestines, etc., of the human body. As before mentioned, these eggs, especially such as have escaped from the proglottide, may attach themselves to meat or other articles of food upon which they have fallen by mere accident; it may be also that they are often received into the human body through the insufficiently cleansed internal organs of slaughtered animals or game.

From this point of view let us now consider the appearance of the hydatid stage of the tapeworm as the result of feeding upon animal food, although here it is only the measles, the entozoic cyst, which seems to come under our notice as the creating cause of the tapeworm. I would also further remark that, at the present time, aside from the trichina spiralis, there are but a few hydatids and tapeworms of which we have a sufficient knowledge to enable us to adopt preventive measures against them; hence, only these will be noticed. In what manner the bothrioccephalus, in its immature state, finds entrance into the human being, is at the present day unknown; the cysticeroid stage of the taenia nana, *t. flavo-punctata*, and the *t. elliptica*, of which the first two have been observed but once in man and the latter but seldom, we are but little acquainted with. Leuckart, Jun., thinks it probable that these, in their first stage of development, exist in the cold-blooded animals. In regard to all these as yet imperfectly known entozoa, the most we can do is to endeavor to destroy them in their different stages of development, so far as lies in our power.

The hydatids against which man has to protect himself, that is, which take up their dwelling within the human body, are, according to the present stage of scientific knowledge, the *cysticercus cellulosus* (the immature stage of the taenia solium, or common tapeworm), the *cystic. tenuicollis*, (from the *t. marginata* of the dog), the *cystic. acanthotrias* and the *echinococcus* (from the *t. echinococc.* of the dog).

Whether the hydatid stage of the *t. mediocanellata* has ever appeared in man is yet undecided.

The tapeworms which appear in man, and are at the present day better known, are the *taenia solium* and the *t. mediocanellata*.

The taenia solium, doubtless, threatens us in both stages of its development, as cysticercus, (the larval form), and as tapeworm. As a source of danger, it rivals the echinococcus, of which from one sixth to one fifth of the whole population of Iceland are said to perish.

Any special preventive, available to the public authorities, securing protection against the eggs of the tapeworm, viz., the measles of swine, has not yet been discovered; individuals must guard themselves from contaminating hands, food, or drink with the eggs of the tapeworm, or their proglottides; those who harbor tapeworms within their bodies are

naturally most exposed to infection. Since the proglottides from excrements exposed to the air, or their liberated eggs, may easily be deposited upon salad and the like, through the medium of rain-water, it is necessary to exercise great care in the preparation of such articles of food. Of course drinking water may also become infected with these eggs. It is well for persons affected with tapeworm to use care in regard to the proglottides which escape from themselves; although such care cannot help them, it will not harm them.

What is true in regard to the ingestion of the larval form of the tapeworm is, of course, equally true of the subsequent danger from the later stage of development; that is, from the eggs thrown off by the tapeworm, the number of which, as we know, is considerable.

For the avoidance of ingestion with entozoic cysts, which, unlike the eggs of the tapeworm, are easily recognized by the naked eye, on account of their size and other characteristics, and hence, easily made subject to sanitary regulations, the following rules should be established:

1. The public should be made acquainted with the danger involved in the swallowing of measles or entozoic cysts.

2. The prevention, in every way possible, of swine becoming diseased with measles.

3. All cases of such disease should be brought to the notice of the public authorities.

4. All pork so diseased should be destroyed.

The first regulation needs no further explanation, except to add that in acquainting the public with this fact the danger should be pointed out to them of eating uncooked pork in any form, and it should be impressed upon them that although the cysts may be deprived of life by thoroughly heating the meat in boiling water and in other ways, yet in many cases, as in the cooking of large pieces, or in cooking but a short time, it becomes a matter of uncertainty whether life in the cysts does become extinct, and hence it is advisable to wholly avoid the use of measles meat as food. It were well if such instruction could be introduced into the reading books of our schools.

Measles in swine may be prevented by guarding them from contact with human excrement; since, according to our present scientific knowledge, the tapeworm only appears in human beings. Where fed in pens this is not difficult; but where left to roam at large, or driven in herds through the country, or in similar cases, this is not possible. Such knowledge should be generally spread; particularly the attention of those whose business it is to raise swine, should be drawn to the conditions under which they may be raised free from infection with measles; they should learn also that the progeny of an infected sow may and often does become infected, through the medium of the blood of the mother which transmits the embryos to the blood of the unborn young.

The other regulations offer greater difficulties. The first two regulations should not be the limit of the protective measures to be taken. So far as relates to trichinæ it may be left to individuals to protect themselves in the manner indicated, since aside from the comparatively slight danger from the discharge of intestinal trichinæ with their eggs, the risk is confined to the individual; but whoever, from want of prudence, becomes infected with cystic cellulosæ, and, thereby, with taeniæ, becomes, through the proglottides and eggs of the latter, a source of danger to others.

The most simple and effectual method would seem to be the establishment of a law, with proper penalty for infringement of same, requiring that all slaughtered swine, which are found to be infected with the entozoic cyst, be placed in the hands of the proper officers, by them to be examined, and, according to the degree of disease, either entirely destroyed, or allowed to be offered for sale after the removal and burning of the diseased portions; in the former alternative the owner's loss should be indemnified from the public treasury.

In this way there would need be no concealment of diseased swine, since the owner need suffer no loss from making it known, and thus all such infected meat could be directly destroyed; but an almost insuperable objection to it lies in the amount of trouble thus caused both to owners and officers.

In Westphalia it is computed that one in from one hundred to three hundred swine is diseased—that is, thoroughly infected with the measles; but in carrying out this regulation, it would be necessary to condemn a much larger number than this, since what would be a matter of moment to the Inspector might be scarcely noticed by the butcher.

But the foregoing method is unreliable and impracticable from the injustice there would be in condemning the seller for exposing for sale that which the purchaser has the means of rendering harmless—that is, by subjecting it to a sufficient degree of heat.

The inefficiency of regulations in this matter arises from several difficulties:

First—When the power exercised is insufficient, the meat will be sold cheaper to persons who do not understand the danger, or do not fear it;

Second—Now and again the cysts, when not too numerous, will be removed from the surface of a piece of meat, and the latter will then be sold, while other cysts are more deeply imbedded in it;

Third—Diseased pork not saleable will, especially in country houses, be salted or boiled, and then consumed by the family or servants;

Fourth—It may be mixed with healthy meat and made into sausages;

Fifth—It is scarcely feasible to exercise control over the slaughtering in private houses;

Sixth—Beyond the limits of considerable settlements, it is useless to hope for satisfactory supervision;

Seventh—Where the supervision might be satisfactory in the public slaughter-houses, there would still be danger from imported pork and preparations of the same;

Lastly—With the most careful examination, cysts deeply imbedded may escape detection.

Moreover, a very unfavorable fact is that all regulations against diseased pork will create discontent, inasmuch as it often is eaten (salted) without harm. It is also an error to exclude meat containing but few cysts, or such as, containing many, has been most carefully prepared, and rendered uninjurious by proper cooking. Nor can the authorities draw the limit to the number of cysts admissible, nor supervise their destruction by cooking. If but one cyst be present it is still diseased, and diseased meat must neither be sold nor eaten raw.

Against the use of the lard of measles pork, if fried, there is nothing to be said; if it remains raw, the cysts may be communicated to it from the muscular fibers, or they may attach themselves to it. In Paris it is rendered unpalatable by pouring oil of turpentine upon it. The entrails of diseased swine are to be treated in the same way as the muscular parts of the animal.

Against the possible contamination of the chopping-block, which can thus infect sound meat, all must be left to the care of the butcher.

The inconvenience to the butchers resulting from the purchase of diseased pork renders it desirable to seek for external signs of the measles in the living animal. As such signs, the presence of cysts in or under the conjunctiva of the eye and on the under surface of the tongue has been recognized. For the examination of the latter with eye and finger, it must be made to protrude itself from the mouth; in France they have a very skillful method of doing this; but the way in which it is generally done is so harsh as to torment and even often to injure the animal, and hence dealers are not willing to permit it. Moreover, such examination of tongue and eyes is not decisive; an animal may be diseased without displaying any cysts in these parts.

It is to be observed that, like the trichinæ, the cysts prefer the fore-parts of swine, as the tongue, neck, shoulders, and within the intercostal muscles. In diseased swine, there may be some muscular parts entirely free from cysts. Wild swine are sometimes, though seldom, attacked by the cystic. cellul.

In regard to this disease, the flesh of deer should be treated the same as that of swine.

The chief preventive against infection from the measles of swine, as against other dangers from animal food, will always consist in the custom becoming prevalent of never eating raw meat, and boiling or roasting it until the inmost parts are raised to boiling heat; otherwise it must be rejected as food.

The eggs of the *taenia marginata* of the dog may produce the *cysticerci tenuicollis* in the human body. Individual cleanliness is the only direction to be given here. *Cystic. tenuicoll.* also find their way into swine and the ruminants, making their dwelling particularly in the caul and liver; it has also been observed in the squirrel and monkey. The *cystic. tenuicoll.* of swine is perhaps harmless for man, since he is not subject to the *taenia marginata*.

Which tapeworm it is from whose eggs man must defend himself in order to remain secure from the *cysticercus acanthotriax* is not yet known.

Echinococci, from the *taenia echinococcus* of the dog, is a most alarming danger to which man is exposed, but not through the medium of food. Fortunately it is a danger which may be avoided by individuals protecting themselves from the eggs of this tapeworm. With this aim the following regulations might be established:

1. Preventing dogs from feeding upon the remains of beef containing *echinococci*; or better still, animal remains containing any vesicles. (*Echinococci* are found also in the turkey and squirrel.)

2. The keeping, by themselves, of dogs who are infected with *taeniæ echinococci*, the purgation and destruction of the *taeniæ* so that their proglottides may not fall upon the food of cattle, or upon human nourishment.

Since the proglottides of the *taenia echinococcus* are so small that the presence of the worm may pass unnoticed, in Iceland it is recommended to shut up, at regular intervals, all dogs, say once in four weeks, for a length of time sufficient for effectual working of some purgative remedy, to administer this remedy, and then to burn the tapeworms thus expelled.

To prevent infection of the human body with the *taenia medio-canellata* it is necessary to keep at a distance the *cysticercus t. medio*. The latter appears generally or solely in beeves. Regulations in regard to this should correspond with those in regard to the measles of swine.

In sheep, beeves, hare, and swine, we now and then meet with great quantities of the *distomum hepaticum*, which also attacks man; but so far as scientific observation has gone, the human being does not become infected by direct ingestion of the liver fluke, or its eggs, with the parts where it has been located in the slaughtered animal, but the eggs, either in water or some fluid substance, develop into glistening embryos; these, Genekart thinks, probably bore their way into a snail, where they become the so-called sporocysts, whose germs, cercinate in form, may fall in the meadow where cattle feed, or upon vegetables, or into water, and thus be swallowed by cattle or by man. The eggs of the fluke enter with the gall into the intestines, whence they are expelled with the excrements, from which the falling rain may wash them into pools of water.

Against the sale of the meat of animals, infected with the liver fluke, it seems unnecessary to speak. The muscular parts of such animals, when extensively affected, in the later stages of the disease become anaemic, while the intestines, where the liver fluke dwell, are also changed; but there seems in neither to be any inherent harm, aside from the parasite itself.

It may here be remarked, that the liver fluke of man and animals prevails much more in some districts than in others, and in some years are very prevalent among animals—particularly sheep—in others, less, so; in the former case they often cause great fatality among sheep. The chief thing to be done in such circumstances is not to pasture the sheep on ground sloping towards standing water—especially those already infected that may deposit the eggs in the water; further, to avoid the excrements of such, and to give all animals pure drinking water. When in the neighborhood of animals thus affected, man should exercise the more care in regard to the water he drinks, and in the cleansing of vegetables to be eaten.

Besides the *distomum hepaticum*, there are also other trematodes in the human body, which do not appear to be introduced there by ordinary animal food.

(e) There are certain diseases among animals adopted as food by man, which convey into the human body no parasite nor other contagious or poisonous influence. These do not render these animals harmful as food, whether the disease may have terminated in death, or whether the animal may have been killed at an earlier stage thereof.

Thus far experience has not shown that there is danger from meat diseased by the rinderpest, or by lung diseases of beeves. There have been cases known where symptoms of poisoning have resulted from the eating of game which had been greatly distressed and worried before death; also from the eating of the meat of animals that had undergone long marches directly before being slaughtered. The symptoms did not prove fatal. The cause of such phenomenon is not understood, nor is it always produced under the circumstances mentioned. There is nothing to be done in regard to this fact except to spread the knowledge that it may occur.

In regard to the contagious effect from the diseased state resulting from inflammation of the spleen, it has been sometimes asserted that it

cannot be destroyed by a boiling temperature, and that hence the flesh of such animals should always be rejected. It is, nevertheless, an undoubted fact that the muscles and internal organs of such animals have been eaten by man without injury. In cases where infection seems to have resulted, there may have been some other cause overlooked by the observer. But such meat, when raw, is undoubtedly dangerous, and great care should be taken in this regard. It may be eaten by cats or dogs, and swine have been made sick from the water in which it has been washed. Where the meat inspector recognizes the presence of the anthrax, the meat should not be allowed to enter the market, but should be well wet with petroleum, and then buried or burnt. This disease, which attacks all our domestic animals, poultry, and also game, in the majority of cases escapes observation, and the meat is introduced into the market as sound. Hence, when only parts of the animal are observed, as the muscles and some of the internal organs, the disease may remain unknown. The chief means of destroying the contagious effect is the application of a sufficient degree of heat, and the public should be educated in this knowledge.

In regard to the noxious or innoxious nature of the raw or cooked flesh of enraged animals, there is difference of opinion. Here, as in the other affections we have mentioned, there is need of well conducted experiments. It has even been said that the disease has been communicated to man from the eating of the cooked flesh of enraged animals. The same rule holds good in this as in the foregoing cases, viz: destruction of such material when it comes into our hands, and a widespread knowledge of the necessity of sufficiently heating all animal food.

(f) The eggs and larvæ of insects, particularly of those flies that feed on flesh, are often carried into the alimentary canal with meat which has not been well preserved. Under conditions of which we have no knowledge, they there continue to live, to grow, and to occasion certain phenomena of disease. Legislation can do nothing here—it is a matter in which individuals must protect themselves.

It is not improbable that the fungi of mold which vegetates upon illy preserved raw or cooked meat, may make this harmful; but nothing definite is known in regard hereto.

(C)—Public interest demands that the following conditions shall be maintained in the *preservation* of animal food, viz:

(a) Neither its nourishing properties, nor its adaptability to different methods of preparing it for the table, must be diminished;

(b) Its price must not be increased;

(c) No harmful property is to be imparted to it, nor any flavor markedly different from its natural taste;

(d) It must be sufficient for a certain length of time, and for certain external conditions;

(e) It should afford the least possible opportunity for deception.

As we already know, both raw and cooked meats are preserved.

(D)—By far the most common mode of preservation is by means of *salt*, with or without the addition of saltpeter. The salting may be followed by smoking, or by washing in dilute pyroligneous acid. These latter methods are also used without previous salting. In dried smoked meat the drying and smoking may be done simultaneously. In the same way, large quantities of raw animal food, the muscular parts of beef, fish, whole but having the entrails removed; and, in China, shell fish, also,

are preserved by mere drying. In addition to these methods there are many others, some effected by the withdrawing of the atmospheric air from either the raw or the cooked material, others in still different ways.

Salting suffices for all the conditions mentioned, with the exception of the first and a part of the third. It diminishes considerably the nutritive property of the meat, inasmuch as the salt draws the water from the meat, and with the water, the greater part of the phosphates and the potash, nearly all the extractive matters, the soluble albumen, and a great part of the myosin of the meat, and these properties cannot be again extracted from the brine and made to serve for human nourishment. The use of this brine for the feeding of swine is not without danger, since swine have often been made sick from eating it; such effect seems to result more from the ingestion of large quantities of salt and saltpeter than from organic poison. Again, salted meat is inferior to fresh for the preparation of soup, or for roasting; is not generally as palatable nor so good for invalids. In South America, salted meat is often also pressed, and the same is effected with us by its close packing in barrels. This still more increases the loss of substances soluble in salt water. The smoking of salted meat in no way changes these conditions.

Desiccation, practiced in all countries and latitudes, is, with few exceptions, least in vogue in civilized countries; it would seem to be the method best adapted to the purpose. Desiccation is effected by the heat of the sun, and by artificial heat; salted meat, raw meat unsalted, and also cooked meat, may be subjected to the process. Unsmoked desiccated meat answers all the before mentioned conditions; but it cannot be adapted to all our common methods of preparation for the table. Salting is often combined with desiccation; but this reduces the nutritive properties of the meat.

If the process of desiccation takes place in a low temperature, and if the pieces of meat are comparatively thick, it may easily happen that only the superficial parts become dried and preserved, while the more central parts, during the process and afterwards, become spoiled. Where desiccation is effected by means of smoke, the so-called antiseptic properties of the smoke come to our aid; but only under certain conditions do these penetrate to the innermost part of thick pieces.

Meat thus treated loses in nutrient value, and acquires a specific flavor. Desiccation, salting, and smoking may destroy life in trichinæ, and other organic life in meat; but whether this has been effected in any piece of meat depends solely upon the depth to which these agents have penetrated, and upon the force of their action. The same conditions are of like value in preventing putrefaction.

At the present time there are only these three methods which are of value in transporting meat (mammals or fish) considerable distances; but these do not suffice to give us the *full measure* of the benefit to be derived from the surplus supplies of the waters, and of South America, Africa, and Southern Europe. Hence, the supply of meat from these regions has, as yet, but little value for civilized countries. Some method of preservation which would fulfill all the required conditions mentioned, would be of the highest sanitary value, since it would be the means of furnishing animal food cheaper to the poorer portion of the people. All efforts in this direction are of the greatest importance to us; and the discovery of such a method would bring with it a rich pecuniary reward.

The extract of beef—a South American preparation according to Liebig's method—has of late years availed, in this respect, to a certain extent. This extract keeps, without special care, even under the most unfavorable conditions.

With the view of making the South American surplus profitable for Europe, a large number of methods of preservation have already been proposed, but all are of limited application and often fail to correspond with the conditions required.

Morgan adopts the method of washing out the whole animal with salt water before skinning it, then allows this and the blood to flow out, injects into the vessels a mixture of salt, sugar, and saltpeter, removes the skin, cuts in pieces, dries, and packs in sawdust and burnt bone.

Young packs the raw meat in the sulphurate of lime and the hydrate of lime, which absorb the oxygen of the air within the box, and also the moisture or steam, and the carbonic acid.

Pienkowsky salts the meat with the acetate of soda, not with cooking salt, and dries it; the meat can afterwards be easily freed from the salt, which may be extracted with water, but it also loses albumen with this.

Others pour fat, paraffine, etc., over raw, dried, or prepared meat.

The preservation of cooked meat, with or without spices, and the broth of meat, inclosed in small tins, is doubtless useful in certain conditions, but does not suffice for the interest of the masses whom we would feed. In the closed boxes the consumer may be supplied with spoiled material, which may either have been spoiled when put into the box, or have become so later. For the fitting out for sea voyages, long expeditions, and for troops, this point is of great import; too much caution cannot be used here. In other cases, the consumer can be left to care for himself.

In regard to this method of preservation, it may be mentioned that the meat is usually put into the boxes raw, and is then—the boxes having been first closed and soldered—subjected to a high temperature or pressure, in boiling water or otherwise; while being cooked, a small opening is usually left in the box for the escape of steam and air, the opening being closed during the process by a drop of solder. The broth of meat is poured in to fill the empty space in the box. The broth alone, with or without the addition of vegetables, is also preserved in the same way as the meat. Another method of preserving the broth of meat is first to steam the latter for awhile and then mix the liquid with flour, thus forming a dough, which is baked, making what is called meat biscuits; these are also made by mixing the meat finely chopped after having been cooked, with the flour and broth.

In families meat is sometimes preserved by laying it in *vinegar*, which method is still worse than that of salting, since by it still more of the nutrient properties of the meat are withdrawn. Runge has advised as a substitute, that the meat be exposed to the steam of acetic acid; this may easily be done, and, if no considerable condensation of the vapor into drops takes place, it is evidently the preferable method of the two.

For some kinds of animal food, sardines, for instance, *oil* is used as a preservative.

Cold is also made preservative of meat, as in the ice houses of butchers, and in the packing of fish, poultry, and other meat, in ice and snow, for transport to considerable distances.

Before leaving this division of the subject, I would also refer to some other points of sanitary interest, but which could not be included under the foregoing heads.

The muscles of animals, the most important part of animal food, differ in value as a means of nourishment for man, according to breed, age, condition, according to the degree of labor or rest for some months previous to slaughter, and also according to the nature of feed. This difference is especially marked among neat cattle whose muscles are tender or tough, juicy or dry, rich or poor in those elements which quickly elevate the human powers. It has not yet, to my knowledge, been ascertained what chemical or histological conditions are the foundation of these differences. They may arise partly from the different relative proportions of phosphorus, lime, and iron. The proportion of water contained does not decide the nutritive value, for muscles rich in fat contain less water than those that are leaner, and yet may be of inferior nutritive value to the latter; neither is it the greater proportion of water contained which makes veal less nutritive than beef, or the young of fish and mollusks inferior in the same respect to full-grown animals of these species.

As every one knows, the muscles of the *different parts of the animal* differ in quality; the muscles of the back, and particularly of the loins, are the most juicy, the most easily managed by the teeth and evidently by the stomach, also, and the most *strength-giving*.

Animal chemistry, great as its progress has been during the last thirty years, is not yet so far advanced as to enable us to give useful data in regard to the relative value of different kinds of animal food and other particulars of interest to us, and relating thereto; this is to be accomplished in the future. Thus, the present state of science does not warrant my entering into a discussion of the chemistry of the muscles of animals used for human food. In regard, however, to the data given us in our books on organic or physiologic chemistry, or on the science of nutrition, which describe the chemical composition of the animal tissues and fluids, I would remark that we must be upon our guard in considering *all* the substances present in the muscles and capable of assimilation as genuine *nutritive material*; many of them are doubtless *refuse matter*, which, had the animal continued to live, would have been thrown off through the liver, kidneys, etc., and which, taken into our blood through the medium of nutrition, are soon thrown out from the human system through the kidneys, etc., without having contributed anything to our nutrition. These waste substances, which have been already consumed in the animal, may be present in greater or less quantities, according to the various conditions of the animals before death.

(d) The preparation of animal food for the market; that is, the slaughtering and first disposition of the slaughtered animal and its meat, concerns those in charge of the public health in two particulars: (1) In regard to protecting the animal to be slaughtered, or already slaughtered, from the infection of parasites, etc. (2) The influence of the place of slaughter upon the surrounding neighborhood.

(1.) It is a well known fact, and one easily to be explained, that those whose business it is to slaughter and to handle raw meat, are more frequently than others attacked with inflammation of the spleen, and are more subject to trichinæ and infection from measles pork; infection from enraged animals and from diseases of the mucous membranes is more rare. How shall persons thus employed be protected from infection? In seeking an answer to this question we must remind ourselves

that slaughtering is frequently performed not by well taught butchers, but by unskillful persons, who are apt to accidentally cut themselves while working, thus giving more ready entrance to poisonous matters into their systems; further, no official regulations can ever obviate this difficulty, since the owner of an animal will always have the right to kill it.

Could there be a law requiring butchers, masters, or apprentices to pass an examination, they might thus be forced to a knowledge of the dangers of their business, and the remedies and means of protecting themselves; but where this is not the case, all that can be done is to seek to spread the general warning against undertaking the slaughter of suspicious animals by any one having wounds on the hands or arms, and against neglecting wounds received during the work of slaughter; also, to recommend carefully washing out such wounds after the work is completed, and similar instructions.

(2.) The influences emanating from the place of slaughter are of most significant sanitary importance to others not connected with the business; they are of equal value whether proceeding from the flesh of fish or of animals. We have, moreover, to consider that frequently we find in such places, not only the work of slaughtering carried on, but also subsequent labors, such as scalding of swine, removing hides, and cutting up of animals; and sometimes, in addition, the salting and smoking of parts of the animal, and even the making of sausages.

Wherever and in whatever manner this labor is performed, it may prove a matter of inconvenience to neighbors and passers-by in the following ways: (1) The cries of the animal being slaughtered may disturb the neighborhood; (2) the wounded animal may get loose and escape from the inclosure; (3) the slaughtering may be unpleasant to the sight; (4) intercourse and trade may be interrupted or become dangerous from the driving of animals to the place of slaughter; (5) through the maintenance of rats; (6) the air and water, both above ground and under ground, may be rendered impure by the refuse matter from slaughter and subsequent preparation of the animal, as also from that of the stalls.

These conditions are of such moment that the location of places for slaughter should only be allowed where the former can be effectually avoided; the subsequent labors, such as the melting of fat, etc., should always be considered separate from that of slaughtering, and their location be made a separate condition. Even where this business is prosecuted on a relatively small scale, these ill conditions will still arise.

Of the conditions enumerated, the first can be avoided only by locating the place of slaughter at a suitable distance from inhabited dwellings; the second, by sufficient fastenings and inclosings from the streets; the third depends partly upon the situation and partly upon the buildings; the fourth is of some importance to large cities, but not sufficiently so as to make many regulations necessary; at most, it would be sufficient to require that cattle driven through the streets be fettered in some appropriate manner; even in London, traffic is seldom disturbed by the droves of cattle driven through the streets; the fifth is not within the precincts of municipal regulation. The *sixth* meets us everywhere, and is everywhere a source of danger, and hence, demands official surveillance; the refuse material from the slaughter of different animals, differs in quantity and character; swine are scalded or singed, which processes do not occur in the slaughter of other animals; if the singeing be conducted on a large scale it spreads a disagreeable odor of the substance

singed and also of the substance used for singeing, as straw; this, however, is a local matter; in many localities the bristles of the swine are removed mechanically. Ruminants produce an infinitely larger quantity of refuse matter from the contents of stomach and intestines, than other animals.

As refuse, in a more restricted sense, we have (a) the solid parts of the body of the animal, which have no value as nutrient material, (b) the intestinal contents, (c) the blood and urine of the animal, (d) the water used for scalding or cleansing the animal. The first, (a), including horns, hoofs, and hair, are, in part, used for the manufacture of glue, and in other branches of industry; in part, become mere waste material; in the first case, when accumulated in large quantities, moisture may cause them to give out an offensive odor, and in the second, it belongs to the municipal authorities to see that they are properly disposed of. The contents of stomach and intestine are either used as manure, and for that purpose allowed to accumulate at the place of slaughter or elsewhere, or they are abandoned; in either case it is a matter that concerns the public weal; they may give forth an offensive odor, infect the ground, or, by means of rain, spread in a liquid form. The blood is either preserved or abandoned, in either case demanding official oversight that neither the air, ground, or water become infected with the unclean matter. All other products of slaughter mentioned are abandoned and are a matter of moment on account of the large proportion of easily decaying matters which they hold in suspension and solution.

The ground becoming infected, poisons the air, and often the springs of water. One can see that even slaughtering on a small scale may, directly or indirectly, essentially contaminate air and water; and even rivers, not very large, may, particularly in Summer, from extensive slaughterings, become unsuited to domestic purposes. Water infected by decayed animal matter is not purified by filtration.

From ignorance, or want of proper judgment, this matter has been too long neglected; it is by no means an unavoidable condition, nor is its avoidance a matter of expense.

By intelligent arrangements and careful selection of locality, it is not difficult to combine sanitary conditions with the business of slaughtering. One important particular is, not to adopt the prevalent idea that much water is needed to maintain a place of slaughter in a state of cleanliness; if properly arranged, a very little water, used sparingly, suffices, and the neighborhood is saved from the necessity of ridding itself, without injury, of a considerable quantity of impure water.

On account of measles and trichinæ, separate places should be maintained for the slaughtering of swine.

In Paris the law regulates the dimensions of the slaughter houses, and demands that they be ventilated by a transverse current of air, plastered, raised above the level of the street, provided with suitable foundation and drainage; that the walls be covered with some substance impervious to watery fluids; that the building shall contain no fire place, chimney, or stove, nor be directly connected with any sleeping room, or reservoir of water.

Before closing this article, I would refer to the compounded preparations of meat, which are so plentifully prepared both in households and for the market. Among these are the various kinds of sausages, Italian cheese, head-cheese, stuffed meats, swine's heads, dressed and garnished, etc.

Of all the above mentioned articles, *sausages*, in a sanitary point of view, hold the most prominent place; this, on the one hand, for the workmen, who, being necessarily obliged to taste the material used for filling, easily become infected with trichinæ, measles, etc.; on the other hand, for the consumers. Many cases are known of poisoning from sausages in which no poisonous metallic or other similar substance, completely foreign to the compound of meat, could be detected. The poisonous property is as yet not known, but is not necessarily always the same. Neither spices nor salt prevent the poisonous principle from making its appearance. Smell, taste, appearance, nor chemical reactions, thus far used as tests, have given any key to the presence, or non-presence, of the poison; nor do experiments on animals always reveal it. The symptoms of poisoning from sausages do not warrant us in referring it wholly to the ingestion of trichinæ; Schlossberger thinks the poison may be an organic base. Perhaps, however, the poison varies in various cases; in many its origin may be trichinæ, in others in poisonous cryptogami, which vegetate in the substance of the sausages; in others again, in fatty acids in large quantities; and in still others in spoiled meat, the taste and smell of which is disguised by spices. Poisoning, similar to that from sausages, has often occurred from other compounded preparations of meat.

That such food is more likely than any other to possess poisonous properties, is easily believed when we consider the following facts:

That badly decayed portions of meat, otherwise unsalable, are made into sausages, and the taste disguised by being highly spiced; also, that sausages are frequently, and, in fact, generally filled with uncooked meat; when cooked, often only to an insufficient degree; thus spores, trichinæ, and measles in the meat are very likely to escape extinction of life; continuing to live, they produce extensive chemical changes where results may be of great moment to the consumer.

Thus is seen how undesirable sausages are as an article of food, and how proper it is to warn the public against their use.

HYGIENE OF THE TEETH.

LECTURE DELIVERED IN SAN FRANCISCO BY L. C. LANE, M. D.

In the famous history of the hero of La Mancha many precious truths have been communicated to us, and every reader of Don Quixote will agree with me, that this work is a great storehouse of wit, proverbs, and humorous wisdom; from it I will take the liberty of selecting an example which may serve as an introduction to the plain and homely subject of my lecture. In one of his great battles, in which, as usual, Don Quixote came off the conquered, he received a violent blow on his face from a stone, which terminated his fighting for that occasion. On examination afterwards of his wounded visage, he was grieved to find he had lost one of his teeth, and in reflecting thereon, he sagely remarked to Sancho Panza, that losing a molar was very much like losing an old friend.

The subject of my lecture, then, as may be inferred, is the teeth; and, as the subject becomes a broad and endless one if we step into the domain of comparative anatomy, I shall limit myself to the consideration of human teeth.

The complaint is universal, that the teeth of later generations are continually becoming worse and worse, and though no statistical evidence exists upon the point, still reliable observations would seem to establish the truthfulness of such a belief. Let us seek for some of the causes of such degeneration, and, as far as possible, find some remedy therefor. But, first of all, let us study the anatomical form and development of teeth in the infant as well as in the grown man. The part of the tooth which reaches into the cavity of the mouth and is visible to the eye, is called the *crown* of the tooth, while that which penetrates the jaw is called the *root*. Both crown and root are constructed of a hard substance, which may be called tooth-bone; the crown has a thin coating of extraordinarily hard matter known as the enamel, while the root is covered by a matter much less hard, called *cementum*. Now let us take a small section of the tooth-bone and place it under the microscope, and we then find that it is composed of small hollow fibres or tubes, which radiate from the center of the tooth towards its surface. In the center of the tooth we find a soft substance called the pulp, and each of the before mentioned tubes stands in connection with this pulp. The *pulp* consists of a collection of blood vessels and nerves, and occupies a cavity in the center of the tooth called the pulp cavity. From the pulp cavity a small canal leads down into each root, and through this canal a *nerve* enters and *blood vessels* come and go. The pulp may be compared to a living creature, which occupies and fills this house of stone, and receives its supplies through the blood vessels which enter the roots, and maintains a still more intimate connection with the rest of the or-

ganism through a nerve which is ever wide awake, and which, though intrenched in an apparently impregnable fortress, quickly becomes conscious of and suffers from the too near approach of heat, cold, or other enemy. The tubular fibers composing the tooth, independent of the adamantine armor of enamel which covers their outer ends, are, from their perpendicular position, most happily disposed to meet and withstand an immense amount of violence.

Quite as interesting as the *anatomical* arrangement just mentioned, is the *chemical* constitution of the tooth. We find here a combination of organic and inorganic elements, and these are so disposed that, with fair play, the tooth might almost exist for eternity. Of the *inorganic* elements, we will first mention *phosphate of lime*; and here I beg leave to become the eulogist to you of a combination of matter which figures so largely in our organisms. It is the phosphate of lime which gives solidity to the limbs upon which we walk, to the arm with which we wield pen, plough, or hammer. From a defect of this agent the human form, so noble and majestic in its bearing, becomes an unseemly shape of rickety deformity; and it is for this purpose, to seek this agent and start it upon the great circuit of organic life, that the miner delves in the hills of Andalusia, and the mariner seeks the Peruvian Islands and freights his vessel with this precious gift.

Besides the *phosphate* of lime, we find in tooth-bone the *carbonate* of lime. Between the enamel and tooth-bone there is great disparity in the relation of the inorganic or stony elements to the animal matter. For example, in the enamel we have from ninety-four to ninety-eight per cent of the *calcareous* compound, while in the tooth-bone at least thirty per cent consists of *animal* matter; thus, the enamel becomes possessed of endurance greater than that of ordinary stone or marble, and the tooth-bone does not stand far behind it. The teeth of the lower animals do not differ in chemical composition from ours, and the durability of the former is well illustrated in the remarkably finely preserved condition of teeth of animals which belonged to geological periods, ages and ages ago. Buckland not only showed a quaint geological taste in directing his tomb to be hewn in the solid rock, but also a rare geological humor when he treated his friends to a very remarkable banquet—a banquet not remarkable for the age of wines there drank, but for a soup made by extracting the animal matter from teeth of fossilized hyenas, which belonged to a period of millions of years ago. I have already mentioned that in the tooth-bone is a considerable amount of animal matter, which ingredient places the tooth midway between dead and living nature, and this agent also imparts to it a certain quantity of its inherent elasticity. This agent, bearing the technical name of glutinogene, more commonly called bone-gelatine, has played a part rather the reverse of phosphate of lime, since it has lost a part of the reputation which it once enjoyed. This will appear from the following facts: In the year sixteen hundred and seventy-nine, one Papin recommended that bones should be boiled in a strong vessel, tightly closed, in order to extract the gelatine which they contained, which was to serve as an article of food. The strong vessel which he used for this purpose is known to-day in the chemical laboratory as Papin's digester. Bones, as an article of food, rose rapidly in reputation. Charles II, King of England, became deeply interested in the matter; the poor, at that time, used dogs as aids in their begging expeditions, the dogs wearing, fastened about their necks, petitions begging for bones. Papin, by aid of his digester, placed the bones under an immense pressure of boiling

water and confined steam, and he announced his success by the assertion that, by aid of his invention, he was able to convert the oldest and toughest cow into delicate and tender flesh. For a time Papin's invention was lost sight of, until it became revived during the French revolution, when, food becoming scarce, Gimbernat, Pelletier, and others, again recommended bones, and they went so far as to say that without any cost France might be enriched with as many oxen as would equal in weight the bones before thrown away. The government itself declared the bone a dish of soup already prepared by nature. It even went so far as to say that one pound of bone was equal to six pounds of meat. The extract prepared therefrom, known as Rumford's soup, was used in all the hospitals; the result upon the patient, however, not proving as good as the chemists had predicted, it fell somewhat into discredit, and finally a French commission, consisting of Dupuytren and Magendie, pronounced the soup to be worthless, and thus glutinogene or gelatine, after a most eventful career, in which the greatest chemists, an English King, and the French government had figured, was remanded back to comparative ignominy as a simple constituent of bones and teeth, where we now find it.

We will next notice the developments of the teeth; and in this respect they fall under two heads, namely, the infantile or milk teeth, and the adult or permanent teeth. The former, twenty in number, soon give place to the more durable. When the child is born the crowns of the twenty milk teeth are already developed, but concealed within the gums; at the same time, near the infantile teeth are the germs of the future permanent teeth. As a rule, the first teeth make their appearance about the sixth month of infantile life, in the middle of the lower jaw—corresponding to these similar ones appear in the upper jaw—and in eighteen months from the eruption of the first, the child has its full number. It is wonderful what a species of scape-goat this primary dentition has become; for example, if the child cries, or is peevish, has derangement of the stomach, a slight fever, or a mild eruption, the mother contents herself with the all-satisfying remark, "My child is only teething."

About the seventh year second dentition begins; that is, the milk teeth fall out, and permanent ones take their place. The infant's jaw was not capable of containing more than twenty teeth, but now it has increased in size so much that there is room for a greater number. So uniformly does the first permanent tooth make its appearance in the seventh year, that French writers have named it the seventh-year tooth; about the eleventh year the infantile teeth have been entirely replaced by the permanent ones; a year later, four large molars make their appearance, and finally, between the sixteenth and twenty-fourth year, the last four appear.

Long continued pressure upon any portion of the body, finally causes the part to shrink and disappear; in this way we are able to explain the disappearance of the roots of the infantile teeth, for near them, as before said, are the primordial germs of the future permanent teeth; these germs, gradually growing, ultimately so push upon the roots of the milk teeth as literally to reduce them to nothing, so that usually we are surprised at how readily the child's tooth is extracted.

The remark is very often heard, that it is not worth while to save the child's teeth, since they are soon to be replaced by others. This is quite an error. If the child's tooth be extracted long before it is ready to fall out, that part of the jaw whence it is taken shrinks, the neighboring teeth

approach each other, and it sometimes then happens that the permanent tooth never arrives at eruption, but remains hidden in the jaw; or, if it does come through, it often assumes an irregular and unsightly position. Another reason, however, for irregular position of the teeth, is that the permanent germs are disposed irregularly; but sometimes this arises from the teeth being disproportionately large for the jaw itself. Such irregularity should, if possible, be corrected, since it predisposes them to become hollow, owing to the difficulty of properly cleaning them. It may likewise be added, that if an error is sometimes committed in extracting the infant's teeth too early, the opposite error sometimes occurs of their never being extracted.

I will now speak of the causes which influence dental decay, and these causes, it may once for all be said, influence the infant as well as the adult tooth. Whatever the *remote* cause may be, the *proximate* one may be put down as caries, which may be defined as slow death of the structure of the tooth, ending finally in the tooth becoming hollow. The question may here be asked, does dental decay arise from causes within the tooth, or does it depend upon extraneous influences? The answer is, that caries, or dental decay, results from a chemical decomposition, brought about by causes outside of the tooth itself; hence, it is a grand exception that the disease starts from the pulp cavity, but, instead, it starts from the outside and proceeds inwards. A very eminent investigator, who has searched a great number of teeth, states that he has not found one where the disease began *within* the tooth.

There is a difference in teeth in regard to their susceptibility to decay. Bluish white, transparent teeth, however beautiful they may appear, are much more inclined to become hollow than yellow ones which are thickly invested with enamel. But this quality of durability and power of resisting decay, is acquired at an earlier period than many of you might think. The crowns of the permanent incisors, canine, and first molar teeth, are developed in the first eighteen months of life, consequently during the time that the child is nourished by its mother's milk; hence the condition of health and the chemical constitution of the mother's blood has a great influence upon the durability of these teeth. The foundation is then laid, and if it be frail, the future structure will soon fall; and this is emphatically true as regards the enamel, for the tissue which produces this has but an ephemeral existence, and having once accomplished its office, which is fulfilled before the eruption of the tooth, it disappears forever from the stage of existence. The deposit of the enamel for the permanent incisors occurs in the eighth month, and if at this time the child does not receive food containing a sufficient amount of the elements which make the enamel, this substance can never afterwards be formed. If, for example, the child should be sick at this particular period, so that its nutrition is greatly interfered with, this very illness, with its disturbing influences, is rendered manifest, and is engraven on the defective enamel of the adult tooth.

Let us now turn our attention to the direct *chemical* causes which influence dental decay. We have already seen that among the mineral elements composing the tooth, carbonate and phosphate of lime hold the leading rank; now these are lime compounds, and as such, are called basic, or alkaline salts, since the lime predominates over the acid with which it is united; now such a compound can only be attacked or dissolved by acids; on the other hand, the gelatine, or animal matter, before spoken of, is only influenced by the presence of some agent which tends to dissolve it, and among *these* we may mention the so-called septic

substances; but in the enamel which covers the tooth we have found there was but a mere trace of animal matter, while the lime compounds which so greatly predominate are liable to become dissolved by any acid which remains in contact with them for a considerable time. The conclusion to which we arrive, from the facts just presented, is that the great enemies of our teeth are acids. Let us now see how acids may find their way to the teeth. One, for example, is directly introduced as an article of food, viz., vinegar; another source of acid is from the decomposition of sugar in the mouth; sugar, under favorable influences, which are ever present in the mouth, may readily undergo decomposition, or change into an acid known to chemists as lactic acid; likewise, in the mouth, starchy foods, if properly chewed, are converted into grape-sugar, and this, undergoing a second change, may, as in the previous case, present itself in the form of lactic acid.

When, however, the mouth contains no food, there is present a small amount of saliva, and this, when in normal condition, is alkaline in nature, and thus becomes an excellent preservative for the teeth. But, instead of the saliva always retaining its alkalinity, it may, in certain conditions of ill-health, become acid, and then it becomes a solvent of the enamel. This acid condition of the saliva is, fortunately, a rare occurrence, so that, as a rule, the saliva exercises its conservative influence; and as it gravitates to and occupies the lower front portion of the mouth, from this reason the lower teeth usually outlast the upper ones; and hence tobacco chewers who would fain find some plea, some palliating excuse for their habit, claim that it preserves their teeth—and this is perhaps true, from the increased flow of saliva which is thereby induced; but, unfortunately, this dentifrice affects not the teeth alone but often induces functional disease of the heart—rather a high price to pay for the preservation of the teeth. Tomes has likewise found that the *mucus* of the mouth is slightly acid, and hence, when allowed to accumulate, endangers the existence of the teeth.

When the enamel is strong, thick, and smooth, so that it furnishes no attachment points for foreign matters, then the tooth is pretty well protected; but where there are clefts or fissures in it, rendering the surface rough, then foreign bodies lodge there, and the first step of decomposition is taken. Such clefts or fissures are sometimes thought to arise from taking ice-cold drinks immediately after hot ones; experiments, however, made upon extracted teeth have not confirmed this opinion. Decomposition having made a breach for itself through the enamel, and having reached the tooth-bone, proceeds inward with rapid march; the hollow cavern once formed, the acid and septic enemies, allied forces, intrench themselves, and with redoubled strength assault the inner citadel.

The cavern which is formed by the causes favorable to caries has, strange as it may seem, become the home of the living creature. Let us extract a small portion of this carious matter and place it in the field of the microscope, and we see things are going on quite lively therein. Small animals are here found, of the infusorial type, presenting all the evidences of active vitality. There is not *one* species only, but *several*; the most usual one being the *denticola hominis*. This animal is shaped like a bean, and is so small that it would take six thousand to extend one inch in length. This little creature, when ousted from its very comfortable quarters, quickly dies. A peculiarity of this animalcule is that similar to the *trichina*, which has lately acquired so sad a notoriety—it finally undergoes a transformation into chalk; that is, it

becomes fossilized, transforming itself into a small gravestone to mark the site of its former sphere of life. Likewise, *vegetable* parasites are found in hollow teeth, of the algoid and fungoid types. Klencke has discovered a species, which, similar to moss or ivy upon a wall, fixes itself upon the substance of the teeth, slowly decomposing it.

Having now found how teeth germinate, develop, and decay, let us seek by what rules we are able to preserve the teeth and prolong their existence. There is, unfortunately, no universal specific which can be brought into play here to accomplish this end. We have already seen that the original *constitution* of the teeth, and the *solidity* they have attained during development, have a most important influence upon their firmness and durability, and as the foundation of future defect was laid in infancy, it is to that period we should sharply direct our attention; and hence, when a mother has defective teeth, it is advisable, during the time she nurses her child, that she should take some agent to counteract such a tendency in her infant; that remedial agent is the phosphate of lime. Of course, a physician's advice should be called into requisition here. Or in case the mother is not able to nourish her own child, in the selection of a nurse the condition of the teeth should be as carefully looked to as other matters. If these are good, then the young nursling will stand a better chance of having durable adult teeth; or should it be decided to select a nurse with defective teeth, then, as before advised, small doses of phosphate of lime should be taken by the nurse.

Besides defective firmness, the teeth are disposed to become hollow from fissures and other irregularities in the enamel; when such fissure or irregularity is congenital or natural to the tooth, there is of course no remedy. But it is seldom that such defects are natural; they are more likely to have been produced by some mechanical violence, such as crushing small bones or cracking nuts. A breach in the surface is occasionally produced by picking the teeth with metallic objects, viz: needles, pins, etc.; children should be early taught never to do this.

Extreme care should be taken that acids do not remain in the mouth; neither should sugar, or other agents, be suffered to undergo decomposition there. Here the remedy is cleanliness; and again, cleanliness. This is the greatest panacea, the supreme maxim, for the rational preservation of teeth.

But *how* are the teeth to be cleansed? In the first place, the natural use of the teeth in chewing contributes greatly to this end. This is shown in the fact that a tooth which is seldom brought into use presents early signs of decay. This arises from the fact that the collection of mucus upon it sooner or later attacks the enamel. The tooth, in this case, is not an exception to the rest of the organs of the body, which, in order to be maintained in a condition of healthy integrity, must have a certain amount of exercise.

Besides the act of chewing mentioned, *art* must come to our assistance here and aid us with the use of a proper brush. The child should early be taught to use this; and for the child, a softer brush should be selected than for the adult, since in the former the enamel has not become fully hardened; and for the adult, too hard a one should not be selected, lest the enamel here might likewise be injured.

An error frequently made in using the brush on the teeth, is that of drawing the brush transversely across them—that is, by a motion from one side of the mouth to the other. A continuance of this practice for a number of years will finally end in the production of transverse

fissures, which eventually become so deep that the teeth present an appearance as if they had been filed into, illustrating the old Greek proverb, that "water continually dropping, finally hollows out the rock." Such fissures are particularly apt to arise where tooth powder containing charcoal is used; besides, such tooth powder has the unpleasant quality of gradually penetrating into the gum around the tooth, forming a bluish or black line around the neck of the tooth—hence black tooth powder should be rejected. The practice of brushing the teeth transversely has also another pernicious effect—that instead of removing the mucus it merely transports it into the interstices between the teeth, where its presence works most deleteriously. The teeth, then, should be brushed from above downwards, and from below upwards—never from side to side—and besides the outer surface, the inner one also should be as carefully cleansed; in the whole process especial care should be taken that no particles of food be left in the interstices of the teeth. Another reason for this caution is, that the enamel in these interstices is thinner than elsewhere. And finally, not in the morning and at night alone, but *always* after eating anything, the teeth should be cleansed.

Let us next look for the best *materials* to be used for cleansing the teeth. I have already stated that such means should be used as will tend to render inert any acids which may be present. For this purpose certain powders are used, likewise pure soap. A tooth powder, in order to be good, must, above all things, be alkaline, and should contain nothing capable of becoming acid or sour; such, for example, as the sugar of milk, which is not unfrequently used. Wherever a tooth powder is particularly praised for its quality of rendering the teeth very white, it should be looked upon with distrust, since it is pretty sure to contain some agent that will attack the enamel. A good tooth powder, moreover, should be so fine grained, that when rubbed between the fingers no particles can be felt; for if it be coarse grained, it may injure the enamel by friction. The leading qualities of such powder, then, should be alkalinity and fine pulverization. As the chief ingredient of such powder, there is nothing better than carefully prepared oyster shell, or carbonate of magnesia. In order to flavor it, a small amount of powdered calamus root may be added, which has a good effect upon the gums; it may, also, be flavored with a few drops of some ethereal oil. Prepared chalk, mixed with a small amount of camphor, also makes a good tooth powder.

The question is sometimes asked: Which is preferable, a tooth *powder* or a tooth *soap*? Where there is a tendency to a collection of mucus in the mouth, the powder is better; when, however, the enamel is somewhat worn away, and great care is needed to preserve the teeth, then a soap is to be advised.

In dental hygiene, it is a serious error to retain a tooth in the mouth after it has proceeded so far in decay that it is impossible to save it by filling. This remark applies equally to the teeth of children and those of adults; and hence we may lay it down as a cardinal maxim, that whenever a tooth is decayed beyond rescue, it should, for the sake of the others, be immediately extracted; for disease, very much like vice in society, has a tendency to contaminate its neighbors.

Finally, for the preservation of the teeth, the three following rules should be observed:

First—Careful avoidance of acids, and careful cleansing of the teeth with such substances as render acids inert; for instance, alkalies.

Second—Occasional examination of the teeth, in order that a commencing cavity may be detected in due time, and the proper remedy resorted to.

Third—Immediate removal of such teeth as are decayed beyond reclamation.

The observance of these rules will more effectually preserve the teeth than all the nostrums which ever have been or ever will be recommended.

[It is but just to add, that many of the practical ideas embodied in the foregoing lecture were derived from an address delivered a few years since in Berlin, before a society which exists there for the diffusion of useful knowledge among the people at large.]

SEWERAGE.

BY ARTHUR B. STOUT, M. D., OF SAN FRANCISCO.

The inauguration of hygienic processes of every kind, for the sanitation of all places and things, whose unhealthy emanations and malarious effluvia and germ-cells are capable to produce disease, is the important theme of the State Board of Health.

So much has been already written upon the subject of sewerage, and the defects of the present system have been so apparent, with such little favorable result, that it is discouraging to work upon the subject. At the last session of the Legislature it was earnestly hoped that a Board of Public Works, composed of educated and competent engineers, would be constituted, which would come to the rescue and establish a system of sewerage, with improved sewerage pipes, and the use of salt water, to protect from fire and sanify the City of San Francisco. And what was said of San Francisco was applicable to Sacramento and other cities, baring only the salt water for inland places. But after "much cry and little wool," nothing was accomplished.

The consequence is that no improvement in the sewerage system of San Francisco has been made. But for the remarkably salubrious climate with which the city—and especially this year—has been blessed, some portions of the city would be almost uninhabitable. Witness the region of the North Beach, and also the Eleventh Ward, on the south side of the city, and the whole region of Mission Creek and Channel street. The following article from the *Chronicle*, June nineteenth, is a picture of the Eleventh Ward scene; and a still more revolting and disgusting picture may be presented of the North Beach stygian lake. No culverts having been constructed in the bulkhead embankment around this part of the bay, the most offensive accumulations have gathered:

"A PESTILENTIAL SLOUGH.

"One of the most marked and dangerous of Chinese peculiarities is the filth, the terrible filth, in which 'Ah' is content to live, and which seems to follow him as naturally as does his pigtail, into whatever den he makes his home. When, after the fire on Sacramento street, that black, ugly slum was found to have been what scores of Dr. Stone's pets have been living in and over, like rats in a sewer, its existence was righteously, and justly enough, held up as a disgrace to the city and its citizens, especially to the guardians of the public health and weal.

"If any one will take the Folsom street cars, get out at Eleventh street, and walk southeast as far as he can—only two blocks—he will

reach what is marked on the city map as 'Channel street.' An examination of this so-called street will result in a comparison between barbaric and civilized filth, by no means favorable to the latter. A good position from which to inspect that which is not a street, but which is a most horrible slough, is gained by scrambling down through the piles of refuse and debris, jumping across a small sluggish stream, and standing with your back to the gaping, crumbling mouth of a sewer which empties itself wrongfully here. The investigator, it is to be hoped, has no 'nose of nice nobility,' for that which will 'offend' is everywhere.

"Directly in front you have, as you now stand, a piece of bare, desolate common, rising unevenly from the stagnant pool between you and it. The nearer portion of the common looks soft and marshy, the further parts are hard, brown, and grim. A broken fence, a straggling road, dwindling away to nothing in a hopeless manner, a sad, dejected-looking cow or two, a flock of draggled geese, and a group of still more draggled, dejected, and dirty-looking women, who gather up their ragged skirts and scuttle away into their holes of houses at the sight of a stranger, very much after the fashion of rats. To the left in the back-ground, the stacks, out-buildings and yard of a gas works, around which, and extending to your feet, lies the same stagnant pool; which, where its slimy, putrid waters are deepest, is as black as the Styx, but where it shallows at the edge is covered with a green scum, thick and frothy. To the left the houses of Eleventh street run down to the very water's edge, the last 'home' leaning over the evil slush like a decrepid tombstone, whilst a willow droops its blackening branches over the mildew-coated garden foliage, with its leaves lying in the deadly pool, and a little child thrusts its arm out and stirs the willow branches until covered with a glove and gauntlet of the same green slime. Foul and dank the same 'Channel street' creeps along, like an ugly sluggard, by the edge of the City Gardens, by vegetable yards and human dwellings, under the sleepers of the San José Railroad, gathering other and thicker streams from workshop and factory, which do not seem like streams, but look more like frightful stains, bearing refuse and stench and malaria with it. And all around you, as you stand almost choked in the horrible air, lie the dead and decaying bodies of dogs and cats innumerable. San Francisco, thanks to the trade winds and its equable air, has the healthiest climate on the continent, but the earnest endeavors we make to nullify our natural advantages must surely meet with a fitting reward at some time."

There is every prospect, cholera or no cholera, that no radical cure for the evil can be attained, until, by legislative action, a Board of Public Works can be organized.

THE SALUBRITY OF SAN FRANCISCO AND ST. LOUIS.

[From the Alta California, July 27th, 1873.]

"The New York Board of Health has published a report which we have not seen; but several Eastern newspapers give extracts or abstracts of it, and attribute to it a table showing the number of deaths per thousand inhabitants, including the following figures:

Naples.....	39
Berlin.....	38
Milan.....	38
Florence.....	37
Vienna.....	35
Liverpool.....	35
Turin.....	33
Glasgow.....	32
Manchester.....	31
Rome.....	30
Genoa.....	29
Edinburgh.....	26
Dublin.....	26
London.....	24
Vicksburg.....	41
Troy.....	38
Mobile.....	34
Charleston.....	31
Savannah.....	30
New Orleans.....	29
New York.....	28
Baltimore.....	26
Boston.....	23
Chicago.....	23
Philadelphia.....	22
San Francisco.....	21
Cleveland.....	19
St. Louis.....	16

"The figures differ materially from those compiled by Dr. Logan from the Fourth Annual St. Louis Health Report, in which St. Louis was credited with twenty-one deaths in a thousand; Chicago and Boston each with twenty-four; and Philadelphia with twenty-five. Of course, from year to year, considerable changes are possible, but they are not probable. The proportion of sixteen per thousand in St. Louis is incredible, while Cincinnati, a city very similarly situated in nearly every respect, has twenty-two. Missouri has no peculiar features of climate, topography, or popular enlightenment, to give it any superior salubrity as compared with Illinois, Kansas, or Kentucky, nor has its chief city any advantages over the metropolis of Ohio.

"San Francisco, on the other hand, has been recognized as a remarkably salubrious city by many medical authorities. The equability of its climate, the warmth of its Winter, the coolness of its Summer, the dryness of its atmosphere, the strength of its breezes, the abundance of its ozone, the tonic influence of its atmosphere, the open air life and the pecuniary comfort of its people, should make it exceptionally healthy. Many writers of travels have praised the fresh complexions, the plump figures, and the active habits of the San Franciscans. Here we have a mean temperature of forty-nine degrees in January, and fifty-seven degrees in July, showing a difference of only eight degrees; whereas in St. Louis the corresponding figures are thirty degrees and seventy-four degrees, with a difference of forty-four degrees. It is incredible that such a place should be remarkable for salubrity, while it is equally incredible that San Francisco should be insalubrious. We might be content to learn that our city had a larger proportion of deaths than Santa Barbara, San Diego, Sonoma, Oakland, Monterey, San José, or some other present or prospective earthly paradise on our coast, possessing many of the best points of the climate of San Francisco, and having unquestioned advantages in other respects; but to be reported inferior to any city in the hot, humid, malarious Mississippi Valley, is more than we can submit to contentedly.

"One feature of the sanitary condition of St. Louis is the frequency of its fatal epidemics; scarcely a Summer passing without one. The following telegram was published a few days ago:

" 'St. Louis, July nineteenth.—The mortality report this week gives the number of deaths at one hundred and ninety-one, being fifty more than last week. Of this number, fifteen are reported as from cholera, and sixty-nine from cholera morbus. One hundred and thirty-three were under five years of age.'

"Two epidemics are now raging in the metropolis of the Mississippi Basin, and one of these, the cholera morbus, makes its appearance every Summer. It does not attract so much attention, or cause so much fright, as the Asiatic cholera, but it carries off ten times as many victims. The mortality for that week was at the rate of thirty-three per thousand in a year, in a population of three hundred thousand; and of all the deaths reported, sixty-nine per cent were infants—a frightful proportion. In San Francisco, the proportion of infant mortality is about thirty. As cholera morbus and scarlet fever, which carry off a large share of the children in Eastern cities, do comparatively little harm here, San Francisco is the safest place known for raising children."

The writer of this article remarks: "It is equally incredible that San Francisco should be insalubrious." He forgets the ill health engendered by defective sewerage. Certainly, it is incredible that the governing authorities in the State should neglect year after year to apply the proper remedy, by appointing a Board of Public Works; but it is, radically speaking, the people's fault, and they breathe their punishment in foul air, and the deaths among their children. These, from their having in their tender age less resisting power, and being suckled on milk secreted from poor blood, make up the high percentage of mortality. If the people persist in electing incompetent rulers, they imbibe the fruit of their choice. There can be no doubt that if the salubrity of the air of San Francisco were not poisoned from this cause, that its mortality rate, twenty-one in one thousand, would fall below that of St. Louis, given at sixteen in one thousand.

A certain amount of malarious influence is inevitable; it prevails all over the world. Wherever the alternations of life and death by decomposition and reconstruction occur, there will be generated emanations insalubrious to the health of man; but this truth is no apology for the death ratio of San Francisco being twenty-one, while that of St. Louis is only sixteen. The amendment, however, must cost some millions of taxation, and competent engineers to expend the money. While the people persist in electing avaricious politicians to legislative offices requiring high education, they will inhale the offspring of their own incompetency. The ratio of "death in the pot" depends upon the ratio of incompetent lawgivers.

The *Alta California*, of October tenth, well expresses the public want; and we quote it with pleasure, as giving to private opinion the weight of public sentiment.

"A NEW BULKHEAD NEEDED.

"Let it be granted that those of our fellow citizens who have been elected to represent the wants of this city in the Legislature, and to de-

fend her rights, were sincere in whatever pledges to that effect they made before election, and will not go back of their pledges in that respect now that fortune has favored them. To their consideration and favor, therefore, we recommend a consideration of the subject of our city front, and a seawall or bulkhead—that which is partially, and that which we hope is to be, as mapped and published by Mr. T. J. Arnold, 'Engineer of the Seawall.' For it is an important subject, one which interests all of us, and is one of the utmost importance to the city.

"The present condition of our city front may be understood from an observation of the constant operations of the mud scows and steam scoop. A dock is cleaned out and the depth of water made sufficient for dockage of ships; and then another, and then another, and by the time the round has been made, the first one cleaned needs again the labor of the steam scoop. There is the ship Three Brothers, at Market street wharf, not yet loaded, but already lying in a bed of mud, even at high water, and requiring, probably, the power of a steam tug to take her into the stream, where she must be taken to receive the remainder of her cargo, because there is not water enough at the end of Market street wharf to float her when full laden.

"And yet the shipping that has visited this port has been taxed heavily for the conveniences afforded them; and for several years the funds thus raised have been devoted to the building of a seawall which time and experience have shown is inadequate to the purpose intended.

"A proper bulkhead should be so planned and constructed that no eddies should be formed by the tide, either flood or ebb. This we think might be accomplished by means of a seawall, as planned by Mr. Nichols. Besides, his bulkhead would leave a continuous street along the entire city front, from south of China Basin to Van Ness Avenue, for a railroad, and thus ship and car would be brought together; as well as the docks being cleaned out, more or less, by the action of the tides."

The present bulkhead is scarcely a seawall; it is only a rubble embankment, and, as long ago stated, only the predecessor of a city front wall worthy of the shipping interests of San Francisco. In the present order of business the filth deposited, and raised by dredging, is an additional source of insalubrity. If this impurity be calculated, in addition to the nauseous accumulations inside the bulkhead for want of egress through culverts, the depreciation of property in that section of the city, so important to commerce, may be comprehended. As it is, important mercantile houses are excluded from the city front. How changed would be the aspect of things; for now, there is no fine commercial avenue to the front, from Market street to Meiggs' wharf. If a fine esplanade were constructed along this margin of the city, and Jackson street on the north side, and Washington street on the south side, should be opened widely to Montgomery, or to Kearny, on south side of Washington, with an Oriental custom house on one side, and a European custom house on the other, and with the present public buildings occupying the middle block. Add then to these improvements a fine Fresnel light, on the pier, to guide vessels through the dense fogs of Winter nights. But such costly alterations, by no means Utopian, require the coöperation of scientific engineering with the requisite capital.

If to this picture be added the necessity of an improved system of drainage, consisting of reservoirs, constructed in the hills which ridge the city and county in various directions, by taking advantage of the

favorable depressions they present, to form artificial lakes, and supplied with engines to pump salt water from the ocean to fill them, and again provided with pipes to carry this salt water into the sewer tubes of the low lands which form the Eleventh Ward and the great Mission plain. And the honorable Legislature may readily perceive the necessity and advantage of a competent Board of Engineers. The contract system, by thus falling under the inspection of able authorities, would be divested of its means of deception.

SANIFICATION WITH ALUMINA AND THE EARTH CLOSET.

There is another amelioration which may be inaugurated in cities with great advantage to health and comfort, but to be applied on a large scale requires municipal sanction and support. At the present time alumina and earth closets are only used in some private and public houses, or in hospitals; but the value of the system, when judiciously used, is now so fully established in Europe and our Eastern States that it deserves to be adopted as a general principle, and to be made compulsory. This can be done either under municipal authority, or, still more systematically, by companies incorporated, the same as gas and water companies. The processes and apparatus of such companies need not be confined to cities, but are applicable in all sickly places and unhealthy manufactories, butcheries, packing houses, etc., in the State of California.

The disinfecting properties of purified alumina and dry ash, to purify substances whose decomposition creates malarious and putrescent emanations in the atmosphere, are now fully proved. By destroying these, or preventing their production by the coöperation of companies, the principal sources of disease and infection in cities, towns, and villages throughout the State, may be removed. Again, by the purification of these effete matters, they become economical fertilizers, and may be returned to the soil on farms and gardens without offensive influences, while at the same time the salubrity of the locality where used cannot fail to be improved.

To appreciate the value of fertilizers, consult the work of Bruckner and Chynoveth, Philadelphia, eighteen hundred and seventy-two, on "American Manures." The alumina process will add another highly profitable fertilizer to their catalogue, and render all waste products important to commerce. The commercial manures used in England the last year amounted to eight hundred thousand tons. Time will not permit details on this subject, but every agricultural economist and every farmer should study the above named work.

To render alumina fully available it should be purified. This substance is the same as the clay used for brick-making; but as such it contains a large per cent of *silex* sand, and vegetable, or other impurities. To clean it from these impurities is a simple process. Stir thoroughly in a tank with water—a hundred weight or more—and let the sand settle to the bottom, but draw off the water still turbid with the alumina into a second tank, and leave the water at rest; the alumina will now fall to the bottom, and the clear water may be drawn off. The pure alumina thus obtained may be thrown into a depot exposed to the sun, and perfectly dried. It only remains to reduce it to a very fine powder by grinding or rolling it, and keeping it dry for use in barrels or sacks.

It may also be remarked, that the water used has an increased value, as it becomes perfectly purified and disinfected by the process. The water will retain its purity, without growth of vegetable or animal products, for a great length of time, and is, therefore, the best quality of water for ships on long voyages. Its use for this and similar purposes, cannot fail to promote hygiene on shipboard, or for house use, where the water is hard from the presence of lime, or soon spoils from the generation of vegetable and animal growths. Such water has been known to keep perfectly pure during two voyages around the Horn, while other water became foetid and unfit to drink. For steamers, it hence becomes a very desirable article.

On the other hand, the refuse sand, from being well washed, is divested of salt and other impurities, and where very clean sand is required, becomes useful.

Let us then inquire into the utility of the earth closet. Where the human waste descends into sewers properly constructed, it is rapidly swept away into the ocean and lost; but where there is no sewerage, it is deposited in water closets situated in the center of the blocks. Some buildings have several of these closets, but allowing one to every tenement, it is easy to calculate the number of these reeking receptacles in every block. The houses surround them closely, and through their back windows and kitchens receive their noxious effluvia. The comprehension of this state of things may be assisted by imagining these emanations to be rendered visible, by appearing as an actual *smoke*; then would people believe, because they always believe what they see with their own eyes. But it might be compared to the smoke evolved from a suppressed volcano, and the kitchens, dining rooms and bedrooms which commonly occupy the rear of habitations, would be seen filled with odorous smoke. It is, of course, vain to open doors and windows for ventilation—the warm air in the house ascends, and the *smoke* is drawn in. It is the water closets which get purified and ventilated, at the expense of the surrounding edifices.

Now, except where the wealthy live, it is in the rear of such tenements, and in the center of such blocks, that physicians find their patients. With this quality of air is supplied the five hundred cubic feet of atmosphere allotted by law to every normal sleeping apartment for one person! And if such apartments were vacated at midnight, as would not be without example, a sad procession would march to the vicinity of Portsmouth Square.

It not unfrequently happens that public schools are constructed on the hollow square plan, with water closets for the children in the center, and no communication with a sewer. The result is, that foul air constantly enters the school rooms; and the next result is diphtheria, measles, scarlet fever, mumps, croup, whooping cough, *et id omne genus*, among the children. In these cases, the teacher unconsciously gives the best remedy, and sends the pupil home, for fear the others might catch the disease. The banished pupil is truly in good luck.

Doubtless, in time to come, the whole subject of the system of sewerage will be revised anew in California. And although we may not be able to hasten the movement in that direction, we may at least record its foresight. The question will be: Shall the sewage of cities and towns be admitted into the navigable waters, rivers, and streamlets of the State? It is known that sewage not only pollutes the waters, but renders them destructive to health. And again, that it drives from the rivers and bays the fish from their natural haunts. Fish require for

their sustenance the purest water, whether fresh or salt, according to their organization, and some require both fresh and salt according to the law of their development. When the waters become impure by sewage the fish die, or resort to better localities, and return when in due season the purity of the water, according to their mode of testing, is restored. Fish are admirable experts in water assaying. These facts concern the important salmon and trout fisheries of the State. Those enterprising societies who occupy themselves with the introduction of new species of fish will do well to study this question; for of what avail will be the trouble and expense of introducing new fish, as shad—the possibility of which is now proved—if their ova are to be cast into polluted streams?

For the present time, the question may be waived in California; for the population being sparse, and the rivers large, it will be long before the waters may become seriously contaminated. But in England, where the population is dense and the rivers small, the subject has become a question of life and death. The civil and army officers of health are intensely preoccupied with it; and millions are expended to obtain amelioration.

The cost of collecting and disinfecting the sewage is reimbursed by its value as a fertilizer. These processes have introduced the system of irrigation with fluid sewage. The fluid sewage, rich in ammonia and phosphorus salts in solution, is sprinkled over the land to the extent of from four thousand to nine thousand tons the acre per annum. But yet, although the quantity of the resulting harvests is greatly increased, the quality of the products is not always in the same ratio. The great advantage of the system is hygienic. The pollution of the rivers is prevented; the atmosphere is disinfected; and the valuable fisheries are restored.

These systems may well be held in view in the location of new towns, but will probably for a long time to come be neglected; while in California, for fertilizing purposes, the gigantic system of irrigation by canals, with the pure waters of the interior rivers and lakes, is brought successfully into requisition.

WATER TANKS ON THE TOPS OF HOUSES.

[BY DR. A. B. STOUT.]

[The following article was omitted on page 138.]

The water supply of San Francisco is derived chiefly from the Spring Valley Water Company's works. A few other sources exist; certain it is that others should be devised. This water is introduced into houses in two different modes:

First—By direct communication with the main pipes to the emission faucets in the houses. This method supplies the water under the entire pressure from the head of the reservoir. The pressure in many parts of the town is far too great for the convenience of consumers. Accordingly another mode of introduction is resorted to.

Second—In order to moderate the force of the stream, tanks are built on the tops of the houses, which receive the water from the street mains, and the water is thence conducted through the houses by the usual pipes. To regulate the supply in the tanks, and prevent overflow, a spherical copper vessel floats upon the water and connects with a stop-cock in the water pipe. When the tank is full the float rises, turns the valve, and shuts off the supply of water; and again, as the water is withdrawn from the tank, the float descends and allows the valve to open. This ingenious apparatus serves a good purpose; but it has the great disadvantage, in a hygienic point of view, that, in interrupting the free and constant flow of fresh water from the mains, it creates a little lake of stagnant water on every house-top where it is employed. The water is detained in the tank, by not being steadily drawn out, and is exposed to the rays of the sun for indefinite periods of time, and all the organic operations of vegetable and animal germination and decomposition have the same opportunity to occur as in stagnant pools. Months, sometimes years, elapse and no thought is given to clean and sanify the tanks. These remarks are equally applicable to those larger tanks in the Mission plain, which are elevated in the air and filled from wells by the aid of windmills. In these latter, the water often remains for a long while, for the owners are induced to economise the water in order to maintain their supply, when, during the Summer season, there is often quite a length of time in which the wind does not blow strongly enough to work the windmill.

It not unfrequently happens that these house-top tanks are inaccessible, except at considerable trouble and expense, and are not supplied with covers. Housekeepers, who otherwise would be careful, are consequently deterred from taking the proper precautions to sanify their tanks. Persons unacquainted with these facts, and finding the water impure, would be disposed to inculcate the reservoirs of the Spring

Valley Water Company, when, in truth, the noxious swamp is ~~is~~ on the roof of their own houses.

The question of the purity of water, and strictly careful analyses of the varied ingredients which the analytic chemist can detect, are from time to time urged upon the public, doubtfully appreciative of the scientific skill displayed. But let any housekeeper, not too lazy to take the trouble, enter a search into the contents of the tank on his house roof; let him collect a bottle full of its *soil*, and put one drop of it under a proper microscope, and then pronounce—having seen it with his own eyes—upon the *soup* which he drinks.

Many observers know that these house-top tanks are the birthplace of mosquitoes, like any other swamps, only on a smaller scale, and that their offspring migrate into the apartments below them; that various devices of window screens and mosquito nets are resorted to, and that one house will be infested while adjacent ones will be exempt, and yet the hint of the mosquito, truly piquant, fails to awake them to the quality of their beverage.

The water when first drawn from the tank may appear clear and pure, but in a short time it becomes cloudy, emits a faint odor, and soon turns to a greenish color. After a time, green vegetable matter forms, some of which floats on the surface, and, also, gathers on the bottom of the containing vessel. This vegetable growth now becomes the nidus or homestead of innumerable microscopic animalcules of many different species. In due time these plant and animal creations die, and decompose, adding thereby another noxious ingredient to the water. Air and water for human use should be pure, or nearly so; anything short of purity is an incentive to gastric disorder and unfavorable digestion. We may not be able to specify, with precision, if all these vegetable and animal products are actually poisonous when taken into the stomach, nor yet how far the heat of the organ may destroy them, and the gastric juice assimilate them, like other vegetable and animal food, but we do know that such infected water, when drank, produces nausea very promptly. The stomach revolts, and indicates to the mind that something unhealthy has been swallowed. We also know that certain of them escape destruction in the stomach, and are absorbed into the blood, and give rise to toxæmia. It is not our object, here, to discuss these questions, but, accepting the well admitted fact that water, under the above conditions, is unwholesome, to show that these tanks, when neglected, are the prolific generators of septic fevers and other diseases of anæmic type not necessarily febrile.

SYNOPSIS

OF SPECIAL SUBJECTS CONSTITUTING A COURSE OF LECTURES ON
SANITARY SCIENCE AND ITS COLLATERALS, PROPOSED TO BE
DELIVERED DURING THE JUNIOR AND SENIOR YEARS OF THE
STUDENTS IN THE UNIVERSITY OF CALIFORNIA, BOTH IN THE
ACADEMIC AND MEDICAL DEPARTMENTS.

INTRODUCTORY.

The wisdom of the Regents in founding a Professorship of Hygiene—of incalculable benefits, because of the existence of disease and its heredity, which may be averted by a knowledge of the laws of health; considerations sustaining the theory of preventability of disease, and showing in what respects there is a practical and theoretical lawlessness; history of hygiene; epidemics of the dark ages; the dawn of returning civilization contemporaneous with the sanitary code of Bernardo, in thirteen hundred and seventy-four; establishment of lazarettos; modern sanitary science; its objects and its aims the analogue of the ancient.

GENERAL OUTLINES OF THE COURSE.

Hygiene, defined as that branch of sanitary science which concerns the physical condition of man—founded upon the physiological principles by which the organs are governed; in the same ratio that physiology and chemistry become better understood, does it approach nearer to a science; influence of attention to physiology in prolonging life, as proved by mortality statistics; the comparative superiority of other animals in exemption from disease accounted for; facts showing the increase in the duration of life; most diseases arise from avoidable causes; general causes of disease and mortality.

GENERAL DOCTRINES OF LIFE AND ORGANIZATION.

The main facts and principles of human anatomy and physiology, illustrated by drawings, models, and preparations of natural parts, and by references to comparative anatomy and physiology; hygiene of the respiratory organs; of the digestive organs; of the nervous system, muscles, and locomotive organs, etc.; the practical application of this knowledge in preventing certain diseases, and also to cases of drowning, suffocation, burning, hemorrhage, etc.

PRIVATE HYGIENE, OR LAWS OF HEALTH RELATING TO THE INDIVIDUAL.

Embracing the relations of food and water; condiments, stimulants, and narcotics (no part of the course will receive more profound atten-

tion than that upon the terrible evils resulting from the habitual use of narcotics and alcoholic compounds); personal cleanliness; pure air; bathing; clothing; exercise; manual and mental labor; rest; sleep; influence on health of occupation and idleness; of different professions; outdoor and indoor life; relaxation, recreation, amusements, games, sports, etc.

LAWS OF THE RELATIONS OF SEX.

Love the source of all the passions; its abuses and excesses; marriage is its consummation and its emancipation; effects of marriage on longevity; proper selections; effects of, on offspring; mingling of nationalities and races; libertinism; glance at, in ancient and modern times; the most active cause of insanity, and of the dissolution of society; means of combating libertinism.

MENTAL HYGIENE.

The word, hygiene, in its largest sense, signifies rules for perfect culture of mind and body; it is impossible to dissociate the two; the body is affected by every mental and moral action; the mind is profoundly influenced by bodily conditions; effects of cerebral conditions; effects of physical influences; effects of mental conditions and influences; mental hygiene, as affected by the practices of the times, and by the tendency to disease; nature, kinds, and degrees of mental and moral unsoundness; storm signals and beacon lights for the prevention of different forms of insanity and premature mental decay.

DOMESTIC HYGIENE.

Site, surroundings, warming, lighting, and ventilation; house drains, and sewerage of family dwellings; tenement dwellings of the poor; cooking and family discipline, etc.; household science in general.

PUBLIC HYGIENE OR STATE MEDICINE.

State, or as sometimes termed, political, medicine, concerns itself but little relative to the cure of disease; the problem which it seeks to solve, is how disease may be averted; general conditions affecting health of communities or classes of people; climate and topography; meteorological relations; altitude; geological formations; soils; vegetation; exposure to sun and winds; proximity to mountains, plains, marshes, bodies of water, etc.; cultivation; drainage of swamps and low places; irrigation and flooding by dams and canals; rains and droughts; fogs, mists, etc.; potable water; wells; springs; rain water; city and country residences; sewerage of cities; water and gas pipes; narrow streets and lanes; avenues and parks; docks and wharves; pollution of rivers and harbors; interment of the dead, etc.; contagious and malarious diseases, their nature; zymotic diseases; laws of propagation and prevention; quarantine; disinfection, etc.; registration of marriages, births, and deaths the basis of all knowledge in sanatory science; importance of Boards of Health; duties of their officers and other functionaries; influence of occupation on duration of life; influence of modern civili-

zation on health and longevity; general review of the evils to be corrected by sanitary reforms; the fate of man is in his own hands.

The above synopsis is here presented in exemplification of what has been stated in this report to the Governor (page three), and is intended to give some idea of the vast range of subjects embraced in this important branch of education. Only the most fundamental facts and principles have been mentioned, and the whole list of subjects will require revision and modification, as circumstances and exigencies may develop.

Secretary State Board of Health.

LAWS OF THE STATE

RELATING TO THE

Preservation of the Public Health and Medical Matters.

[The portions printed in italics comprise the alterations and amendments found to be requisite.—Secretary of State Board of Health.]

PRESERVATION OF PUBLIC HEALTH.

ARTICLE I. STATE BOARD OF HEALTH.

II. VACCINE AGENT.

III. HEALTH AND QUARANTINE REGULATIONS FOR THE CITY AND HARBOR OF SAN FRANCISCO.

IV. HEALTH REGULATIONS FOR THE CITY OF SACRAMENTO.

V. HEALTH AND QUARANTINE OF OTHER CITIES, TOWNS, AND HARBORS.

ARTICLE I.

STATE BOARD OF HEALTH.

SEC. 2978. The State Board of Health consists of seven physicians—two of the City of Sacramento, and five from other portions of the State—appointed by the Governor for the term of four years.

SEC. 2979. The State Board of Health must place themselves in communication with the local Boards of Health, hospitals, asylums, and public institutions throughout the State, and take cognizance of the interests of health and life among the citizens generally. They must make sanitary investigations and inquiries respecting the causes of disease, especially of epidemics, the source of mortality, and the effects of localities, employments, conditions, and circumstances on the public health, and gather such information in respect to these matters as they may deem proper for diffusion among the people. They may devise some scheme whereby medical and vital statistics of sanitary value can be obtained, and act as an Advisory Board to the State in all hygienic and medical matters, especially such as relate to the location, construction, sewerage, and administration of prisons, hospitals, asylums, and other public institutions. They must at each biennial session of the Legislature make a report, with such suggestions as to legislative action as they deem proper.

SEC. 2980. The Board must examine into and report what in their best judgment is the effect of the use of intoxicating liquor as a beverage upon the industry, prosperity, happiness, health, and lives of the citizens of the State; also, what legislation, if any, is necessary in the premises.

SEC. 2981. The Board must meet at the Capital of the State, at least once in every three months. They must elect from their own number a President and a permanent Secretary; the latter must reside at the Capital, and is their executive officer. No member, except the Secretary, receives any compensation; but the actual traveling expenses of the members, while engaged in the duties of the Board, are allowed, and paid out of the General Fund.

SEC. 2982. The Secretary must superintend the work and perform such other duties as the Board may require. He must furnish the Legislature, when in session, such information cognate to this Chapter as, from time to time, may be necessary. An annual salary of twenty-five hundred dollars, and his office and other necessary expenses incurred in the performance of his duties, must be paid to him in the same manner as salaries of State officers are paid.

SEC. 2983. The expense of the Board, including the salary of the Secretary, must not exceed four thousand dollars per annum.

ARTICLE II.

VACCINATION.

SEC. 2993. The *Secretary of the State Board of Health* must obtain a supply of genuine vaccine matter, and preserve the same for the use and benefit of the citizens of this State.

SEC. 2994. *Said Secretary must* furnish genuine vaccine matter * * * to any regular practicing physician; in good standing in his profession, in this State. He may charge and receive for every parcel or *scab* of vaccine matter furnished, the sum of five dollars, which is in full compensation for his services and expenses.

ARTICLE III.

HEALTH AND QUARANTINE REGULATIONS FOR THE CITY AND HARBOR OF SAN FRANCISCO.

SEC. 3004. The quarantine grounds of the bay and harbor of San Francisco are at the anchorage of Saucelito.

SEC. 3005. The Board of Health of the City and County of San Francisco consists of the Mayor of the city and county, and four physicians in good standing residing in the City and County of San Francisco, appointed by the Governor, and holding their offices for the term of five years.

SEC. 3006. The Mayor is *ex officio* President of the Board. The Board must meet monthly, and at such other times as the President may direct. In the absence of the President, the Board may elect a Chairman, who is clothed with the same powers as the President.

SEC. 3007. The Health Officer of the City and County and port of San Francisco is elected by the Board of Health, and holds office at its pleasure. He must be a graduate of some medical college, in good standing, and must reside within the city limits of San Francisco.

SEC. 3008. The Health Officer may perform all acts which quarantine officers are usually authorized to perform, and he is the executive officer of the Board of Health.

SEC. 3009. The Board of Health must appoint a Deputy Health Officer, who is a physician in good standing; a Secretary, two Health Inspectors, one Market Inspector, and one Messenger, whose duties must be fixed by the Health Officer.

SEC. 3010. The following annual salaries are allowed to the officers of the Health Department: Health Officer, twenty-four hundred dollars; Deputy Health Officer, eighteen hundred dollars; Secretary, two thousand one hundred dollars; Health Inspectors, one thousand two hundred dollars each; Market Inspector, one thousand two hundred dollars; and, Messenger, nine hundred dollars. All salaries must be paid monthly in equal installments, out of the General Fund of the City and County of San Francisco, in the same manner as the salaries of other officers of the city and county are paid.

SEC. 3011. The Health Officer, in addition to his salary, receives such sums for the necessary expenses of his office as the Board of Health may direct, and the Auditor must audit and the Treasurer pay such sums out of the General Fund. The Board of Supervisors must provide proper offices for the Health Department.

SEC. 3012. The Board of Health have general supervision of all matters appertaining to the sanitary condition of the city and county, including the City and County Hospital, the County Jail, Almshouse, Industrial School, and all public health institutions provided by the City and County of San Francisco; and may adopt such orders and regulations and appoint or discharge such medical attendants and employes as to them seems best to promote the public welfare; and may appoint as many Health Inspectors as they deem necessary in time of epidemics.

SEC. 3013. Shipmasters bringing vessels into the harbor of San Francisco, and masters, owners, or consignees having vessels in the harbor which have on board any cases of Asiatic cholera, smallpox, yellow, typhus, or ship fever, must report the same, in writing, to the Health Officer, before landing any passengers, casting anchor, or coming to any wharf, or as soon thereafter as they or either of them become aware of the existence of either of these diseases on board of their vessels.

SEC. 3014. No captain or other officer in command of any vessel sailing under a register arriving at the port of San Francisco, nor any owner, consignee, agent, or other person having charge of such vessel, must, under a penalty of not less than one hundred dollars nor more than one thousand dollars, land or permit to be landed any freight, passengers, or other persons from such vessel, until he has reported to the Health Officer, presented his bill of health, and received a permit from that officer to land freight, passengers, or other persons.

SEC. 3015. Every pilot who conducts into the port of San Francisco any vessel subject to quarantine or examination by the Health Officer, must:

1. Bring the vessel no nearer the city than is allowed by law;

2. Prevent any person from leaving, and any communication being made with the vessel under his charge, until the Health Officer has boarded her and given the necessary orders and directions;

3. Be vigilant in preventing any violation of the quarantine laws, and report without delay all such violations that come to his knowledge to the Health Officer;

4. Present the master of the vessel with a printed copy of the quarantine laws, unless he has one;

5. If the vessel is subject to quarantine by reason of infection, place at the masthead a small yellow flag.

SEC. 3016. Every master of a vessel, subject to quarantine or visitation by the Health Officer, arriving in the port of San Francisco, who refuses or neglects either:

1. To proceed with and anchor his vessel at the place assigned for quarantine, when legally directed so to do; or,

2. To submit his vessel, cargo, and passengers to the Health Officer, and furnish all necessary information to enable that officer to determine what quarantine or other regulations they ought, respectively, to be subject; or,

3. To report all cases of disease, and of deaths occurring on his vessel, and to comply with all the sanitary regulations of the bay and harbor;

—Is liable in the sum of five hundred dollars for every such neglect or refusal.

SEC. 3017. All vessels arriving off the port of San Francisco from ports which have been legally declared infected ports, and all vessels arriving from ports where there is prevailing, at the time of their departure, any contagious, infectious, or pestilential diseases, or vessels with decaying cargoes, or which have unusually foul or offensive holds, are subject to quarantine, and must be by the master, owner, pilot, or consignee reported to the Health Officer without delay. No such vessel must cross a right line drawn from Meiggs' wharf to Alcatraz Island until the Health Officer has boarded her and given the order required by law.

SEC. 3018. The Health Officer must board every vessel subject to quarantine or visitation by him, immediately on her arrival, make such examination and inspection of vessel, books, papers, or cargo, or of persons on board, under oath, as he may judge expedient, and determine whether the vessel should be ordered to quarantine, and if so, the period of quarantine.

SEC. 3019. No Captain or other officer in command of any passenger-carrying vessel of more than one hundred and fifty tons burden, nor of any vessel of more than one hundred and fifty tons burden having passengers on board, nor any owner, consignee, agent, or other person having charge of such vessel or vessels, can, under a penalty of not less than one hundred dollars nor more than one thousand dollars, land, or permit to be landed, any passenger from the vessel until he has presented his bill of health to the Health Officer, and received a permit from that officer to land such passengers, except in such cases as the Health Officer deems it safe to give the permit before seeing the bill of health.

SEC. 3020. The following fees may be collected by the Health Officer: For giving a permit to land freight or passengers, or both, from any vessel of less than one thousand tons burden, from any port out of this State, two and a half dollars; from any port in this State, one dollar

and a quarter; from any passenger-carrying vessel of more than one thousand tons burden, three dollars and seventy-five cents; for vessels of more than one thousand tons burden, carrying no passengers, two dollars and fifty cents; for vaccination, from each person, one dollar.

SEC. 3021. The Board of Health may enforce compulsory vaccination on passengers in infected ships or coming from infected ports.

SEC. 3022. The Board of Health may provide suitable hospitals, to be situated at or near Saucelito, and furnish and supply the same with nurses and attachés, and remove thereto all persons afflicted with cholera, smallpox, yellow, typhus, or ship fever.

SEC. 3023. The Health Officer must keep a record of all births, deaths, and interments occurring in the City and County of San Francisco. Such records, when filed, must be deposited in the office of the County Recorder, and produced when required for public inspection.

SEC. 3024. Physicians and midwives must, on or before the fourth day of each month, make return to the Health Officer of all births, deaths, and the number of stillborn children occurring in their practice during the preceding month. In the absence of such attendants, the parent must make such report within thirty days after the birth of the child. Such returns must be made in accordance with the rules adopted and upon blanks furnished by the Board of Health.

SEC. 3025. No person must inter in the City and County of San Francisco any human body without having first obtained a physician's or Coroner's certificate, setting forth as near as possible the name, age, color, sex, place of birth, date, locality, and cause of death of the deceased; and physicians, when deaths occur in their practice, must give such certificates.

SEC. 3026. Superintendents of cemeteries within the boundaries of the City and County of San Francisco must return to the Health Officer on each Monday the names of all persons interred within their respective cemeteries for the preceding week, together with the certificates mentioned in the preceding section.

SEC. 3027. No Superintendent of a cemetery can remove or cause to be removed, disinter or cause to be disinterred, any corpse that has been deposited in the cemetery without a permit from the Health Officer, or by order of the Coroner.

SEC. 3028. Whenever a nuisance exists on property of any non-resident of the city and county, the Board of Supervisors may, on the recommendation of the Board of Health, cause the nuisance to be abated, and may allow and order paid out of the General Fund all proper charges and expenses incurred in abating such nuisance; and all sums so allowed and paid become a charge upon the property on which the nuisance existed, and may be recovered by an action against such property.

SEC. 3029. The Health Officer must keep in his office a book in which he must make an entry of all fees collected by him. He must pay all fees collected to the City and County Treasurer weekly, to the credit of the General Fund.

SEC. 3030. The Health Officer must execute an official bond, to be approved by the Board of Health, in the sum of ten thousand dollars.

SEC. 3031. Any member of the Board of Health, Deputy Health Officer, or Secretary of the Health Department, is empowered to administer oaths on business connected with that Department.

SEC. 3032. Whenever any cause of action arises under any of the

provisions of this Chapter, suit may be maintained therein, in the name of the Health Officer, in any District Court of this State.

ARTICLE IV.

HEALTH REGULATIONS FOR THE CITY OF SACRAMENTO.

SEC. 3042. The Board of Trustees of the City of Sacramento may establish by ordinance a Board of Health therefor, to consist of five practicing physicians, graduates of a medical college of recognized respectability, and the President of the Board of Trustees is *ex officio* President of the Board.

SEC. 3043. The members of the Board hold their offices at the pleasure of the appointing power.

SEC. 3044. The Board of Health of the City of Sacramento has a general supervision of all the matters appertaining to the sanitary condition of the city, and may make such rules and regulations in relation thereto as are not inconsistent with law.

SEC. 3045. The Board of Health may locate and establish pest houses, and cause to be removed thereto and kept any person having a contagious or infectious disease; may discontinue or remove the same, and make such rules and regulations regarding the conduct of the same as are needful.

SEC. 3046. The Board of Health must exercise a general supervision over the death records of the City of Sacramento, and may adopt such forms and regulations for the use and government of physicians, undertakers, and Superintendents of cemeteries, as in their judgment may be best calculated to secure reliable statistics of the mortality in the city and prevent the spread of disease.

SEC. 3047. The Board of Trustees of the City of Sacramento must, by ordinance or otherwise, provide for enforcing such orders and regulations as the Board of Health may from time to time adopt; and in times of epidemics, or when deemed necessary by the Board of Health, a Health Officer must be employed to enforce the laws in relation to the sanitary condition of said city.

SEC. 3048. All expenses necessarily incurred in carrying out the provisions of this Article must be provided for by the Board of Trustees of the City of Sacramento, who may make appropriations therefor out of the Special Street Fund, if the same is sufficient; if not, they may by taxation provide a Fund therefor.

SEC. 3049. The Board of Trustees must fix the compensation of the Board of Health and the Health Officer.

ARTICLE V.

HEALTH AND QUARANTINE OF OTHER CITIES, TOWNS, AND HARBORS.

SEC. 3059. The Board of Supervisors of any county in which there is a port of entry or harbor, for which there is not otherwise provided health and quarantine regulations, may, by an ordinance, adopt the whole or any part of the provisions of Article III of this Chapter,

appoint a Board of Health, or Health Officer, locate quarantine grounds when necessary, and provide for the enforcement of health and quarantine regulations.

SEC. 3060. In like manner the Board of Supervisors of any county in which there is an unincorporated city or town, for which there is not otherwise provided a Board of Health, or health regulations, in time of epidemics, or the existence of contagious or infectious diseases, may, by an ordinance, adopt for such city or town, in whole or in part, the provisions of Article IV of this Chapter, for some definite period of time, and appoint therefor a Board of Health.

SEC. 3061. The Trustees, Council, or other corresponding Board of any incorporated town or city in this State, may, by ordinance, adopt the whole or any part of Articles III and IV of this Chapter, or of either of them, as provided in the preceding section for the Boards of Supervisors.

SEC. 3062. In the place of appointing a Board of Health, the Board of Supervisors, or the city or town authorities, may appoint a Health Officer, with all the duties and powers of the Board of Health and Health Officer, as specified in the two preceding Articles.

SEC. 3063. *It shall be the duty of every householder in the State, to report, in writing, to the Secretary of the State Board of Health, or to the Health Officer of the township or county in which he resides, immediately, the name of every person boarding at his or her house, whom he or she have reason to believe to be sick of cholera or smallpox, any deaths occurring at his or her house from such diseases; and every person who shall violate these provisions shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than five hundred dollars, or by imprisonment in the County Jail not more than six months, or by both fine and imprisonment.*

SEC. 3064. All necessary expenses of enforcing this Article are charges against the counties, cities, or towns, respectively, for the payment of which the county, city, or town may levy a per capita tax of not exceeding three dollars, or a property tax of not exceeding one fourth of one per cent yearly until the same is paid.

CHAPTER III.

REGISTRY OF BIRTHS, MARRIAGES, AND DEATHS.

SEC. 3073. All persons who perform the marriage ceremony must keep a registry of the time of each marriage so celebrated, the residence, the name in full, the place of birth, the age and condition of each party, and whether either party has ever been before married; if so, to whom, and whether the person with whom such former marriage was contracted is living or dead.

SEC. 3074. All physicians and professional midwives must keep a registry of the time of each birth at which they assist professionally, the sex and color of the child, and the names and residence of the parents.

SEC. 3075. Physicians who have attended deceased persons in their last sickness, clergymen who have officiated at a funeral, coroners who

hold inquests, and sextons who have buried deceased persons, must each keep a registry of the name, age, residence, and time of death of such person.

SEC. 3076. All persons registering *marriages*, births, or deaths, must quarterly file with the County Recorder a certified copy of their register. All such certificates must specify as near as may be ascertained, the name in full, age, occupation, term of residence in the city or county, birthplace, condition, whether single or married, widow or widower, color, last place of residence, and cause of death of all decedents.

SEC. 3077. If at any birth no physician or midwife attends, the parents must make the report.

SEC. 3078. The Recorder must * * * keep separate registers, to be known as the "*Register of Marriages*," "*Register of Births*," and the "*Register of Deaths*," in which the *marriages*, births, and deaths certified to him must be numbered in the order in which they are reported to him. There must be stated in each register, in separate columns properly headed, the various facts contained in the certificates, and the name and official or clerical position of the person making the report. The Recorder must carefully examine each report, and register the same *marriage*, birth, or death, but once, although it may be reported by different persons.

SEC. 3079. The County Recorder must every three months transmit to the Secretary of the State Board of Health at Sacramento City a certified abstract of the registers of births, marriages, and deaths, prepared in the manner prescribed in the instructions of the Secretary, and upon blanks to be furnished by him for that purpose.

SEC. 3080. The persons reporting births and deaths to the Recorder * * * must be primarily paid by the parents or other next of kin to the person whose *marriage*, birth, or death is reported, and the fee allowed by law for recording a marriage. In case no fee is paid to the person reporting a birth or death to the Recorder by the parents or next of kin of the person reported, the same must nevertheless be reported and registered, and the Board of Supervisors must pay from the General Fund of the county a fee of not exceeding ten cents for each name reported to the person reporting and the Recorder registering births and deaths.

SEC. 3081. Any person on whom a duty is imposed by this Chapter who fails, neglects, or refuses to perform the same as herein required, is liable to a penalty of *five hundred* dollars, to be recovered by the District Attorney of the proper county for the use of the General Fund of such county.

CHAPTER IV.

DISSECTION.

SEC. 3093. Any physician or surgeon of this State, or any medical student under the authority of any such physician or surgeon, may obtain, as hereinafter provided, and have in his possession human dead bodies, or the parts thereof, for the purposes of anatomical inquiry or instruction.

SEC. 3094. Any Sheriff, Coroner, Keeper of a County Poorhouse,

public Hospital, County Jail, or State Prison, or the Mayor or Board of Supervisors of the City of San Francisco, must surrender the dead bodies of such persons as are required to be buried at the public expense to any physician or surgeon, to be by him used for the advancement of anatomical science, preference being always given to medical schools by law established in this State, for their use in the instruction of medical students. But if such deceased person during his last sickness requested to be buried, or if within twenty-four hours after his death some person claiming to be of kindred or a friend of the deceased requires the body to be buried, or if such deceased person was a stranger or traveler who suddenly died before making himself known, such dead body must be buried without dissection.

SEC. 3095. Every physician or surgeon, before receiving a dead body, must give to the Board or officer surrendering the same to him, a certificate from the Medical Society of the county in which he resides, or if there is none, from the Board of Supervisors of the same, that he is a fit person to receive such dead body. He must also give a bond, with two sureties, that each body so by him received will be used only for the promotion of anatomical science, and that it will be used for such purpose within this State only, and so as in no event to outrage the public feeling.

CHAPTER V.

CEMETERIES AND SEPULTURE.

SEC. 3105. The title to lands used as a public cemetery or graveyard, situated in or near to any city, town, or village, and used by the inhabitants thereof continuously without interruption as a burial ground for five years, is vested in the inhabitants of such city, town, or village, and the lands must not be used for any other purpose than a public cemetery.

SEC. 3106. Six or more human bodies being buried at one place constitutes the place a cemetery.

SEC. 3107. Incorporated cities or towns, and for unincorporated towns or villages, the Supervisors of the county, may survey, lay out, and dedicate of the public lands situate in or near such city, town, or village, not exceeding five acres, for cemetery and burial purposes. The survey and description thereof, together with a certified copy of the order made constituting the same a cemetery, must be recorded in the Recorder's office of the county in which the same is located.

SEC. 3108. The inhabitants of any city, town, village, or neighborhood, may by subscription or otherwise purchase, or receive by gift or donation, lands not exceeding five acres to be used as a cemetery, the title thereof to be vested in such inhabitants, and when once dedicated to use for burial purposes must thereafter be used for no other purpose.

SEC. 3109. The public cemeteries of cities, towns, villages, or neighborhoods, must be inclosed and laid off into lots, and the general management, conduct, and regulation of interments, permits to inter, or remove interred bodies, the disposition of lots and keeping the same in order, is under the jurisdiction and control of the cities and towns owning the same, if incorporated; if not, then under the jurisdiction

and control of the Board of Supervisors of the county in which they are situated.

SEC. 3110. The Boards of Supervisors, City Trustees, or other corresponding authorities having jurisdiction and control of cemeteries, may make general rules and regulations therefor, and appoint Sextons or other officers to enforce obedience to the same, with such other powers and duties regarding the cemetery as they may deem necessary.

SEC. 3111. The authority having control of a public cemetery must require a register of name, age, birthplace, and date of death and burial of every body interred therein, to be kept by the Sexton or other officer, open to public inspection.

CHAPTER LXXXI.

An Act concerning the attendance of physicians and surgeons in certain cases, and to provide payment for making chemical and post-mortem examinations.

[Approved February 8, 1872.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. The Coroner or other officer holding an inquest upon the body of a deceased person may summon a physician or surgeon to inspect the body, or a chemist to make an analysis of the contents of the stomach, or the tissues of the body of the deceased, and to give a professional opinion as to the cause of the death.

SEC. 2. Any physician, surgeon, or chemist, professionally attending as a witness on an inquest, or upon a trial of any person charged with murder or manslaughter, or in cases *de lunatico inquirendo*, as above provided, shall be allowed a reasonable compensation for such attendance or examination by the Board of Supervisors, upon the written certificate of the Court or officer requiring such services, as to the extent and supposed value of the same; *provided*, that such certificate shall not be conclusive as to the amount of compensation.

CHAPTER CCCLXXV.

An Act to establish and maintain a dispensary in the City of Sacramento.

[Approved March 23, 1872.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. The Board of Health of the City of Sacramento, consisting of Ira E. Oatman, T. M. Logan, F. W. Hatch, W. R. Cluness, and G. L. Simmons, are hereby empowered and required to establish a Dispensary for the accommodation of the sick poor of the City and County

of Sacramento on the lot belonging to the County of Sacramento, on the northwest corner of Seventh and I streets in said city; and all bills approved by said Board of Health for this purpose shall be allowed and ordered paid, by the Board of Supervisors of the County of Sacramento, out of the General Fund; *provided*, that all expense for the establishment of such Dispensary and furnishing of the same shall not exceed two thousand dollars.

SEC. 2. *The Board of Health shall annually elect a regularly educated physician* to take charge of said Dispensary, and to keep an office open therein, and shall give advice and medicines to poor out patients and applicants from the Howard Benevolent Society, and receive orders for visits to the sick poor at their homes, and said *physician* shall receive a compensation not to exceed fifty dollars per month.

SEC. 3. During the absence of the medical attendant the Dispensary shall be accessible, at all times of the day or night, to any member of the police of the City of Sacramento, to any practicing physician, or to any officer of the Howard Benevolent Society who may desire to obtain accommodations for patients in cases of accident or sudden sickness, where an immediate removal to the County Hospital is impracticable, or where such an attempt would endanger life.

SEC. 4. No person possessed of property of any description shall receive assistance, as an out patient, from the Dispensary, and no cases of venereal disease in any form shall be treated at the expense of the county in this institution.

SEC. 5. After the establishment of the Dispensary by the Board of Health of the City of Sacramento, the said Board shall exercise a general supervision over its concerns, adopting such improvements in its management as from time to time may be required. They shall require from the attending physician stated reports in regard to cases treated by him, and certify to the Board of Supervisors of the county as to the correctness of all bills for medicines or incidental expenses; *provided*, that in no case shall any bills for medicines and incidental expenses be allowed which exceed in the aggregate the sum of one hundred dollars per month. No compensation shall be allowed to any member of the Board of Health for services rendered in carrying out the purposes of this Act.

SEC. 6. The Board of Supervisors of Sacramento County are hereby required to allow and order paid out of the Hospital Fund all bills for the maintenance of this Dispensary which may be approved by the Board of Health of the City of Sacramento, in compliance with the preceding sections.

SEC. 7. This Act shall take effect and be in force from and after its passage.

CHAPTER CCCCLIII.

An Act to provide further accommodation for the insane of the State of California, and to provide a Special Fund therefor.

[Approved March 27, 1872.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. There shall be established, upon a site to be selected by Commissioners chosen therefor, an institution for the care and treatment of the insane, to be designated as the — State Asylum for the Insane, the blank before the word State in this section to be filled by the name of the place, city, town, or county where said Asylum shall be located.

SEC. 2. The Governor is hereby authorized to and shall appoint three Commissioners to select a site for said institution.

SEC. 3. The selection of the site for said Asylum shall be confined to the central and western portion of the State, embracing the central coast counties and the counties bordering on or near the Bays of San Francisco, San Pablo, and Suisun, and lying west of the valley of the Sacramento and San Joaquin rivers, the Commissioners being authorized, upon the above named basis, to fix more definitely the limits to the territory to be admitted and considered in the selection of said site. In making a selection of a site for said institution the Commissioners shall not be influenced by any offers of money or property, but shall decide upon said site solely upon the grounds of healthfulness, adaptability to the purposes of the institution, and convenience of access from the different parts of the State.

SEC. 4. Said Commissioners shall qualify by taking an official oath within ten days after their appointment; and within fifteen days after their appointment they shall meet and organize by selecting of their number a Chairman and Secretary; they shall have power to receive by gift or to contract for the purchase of such site for the location of said Asylum, subject, however, to the approval of the Governor and Secretary of the State Board of Health, to whom they shall report their action in the premises, addressed to the Governor, within four months after their appointment; they shall keep a record of their proceedings; they shall receive for their services ten dollars per day and their traveling expenses; *provided*, the entire compensation shall not exceed the sum of three hundred dollars for each Commissioner. Their bills shall be audited by the State Board of Examiners and paid out of the General Fund. When the site by them selected and their official acts and contracts to secure the same to the State for the use aforesaid shall be duly approved, as herein provided, their powers, duties, and compensation shall cease.

SEC. 5. When the site for said Asylum is determined and the title thereto obtained in accordance with the foregoing sections of this Act, the Governor shall appoint five Directors to manage the affairs of the institution, three of whom shall be residents of the county in which said institution shall be located; and he shall designate at the time of such appointment their respective terms of office, in accordance with the following classification, to wit: three of said Directors shall serve for two years, and two of said Directors shall serve for four years from

the time of their appointment. Their successors shall be appointed by the Governor, and shall hold their offices for the term of four years and until their successors are appointed and qualified. In case of a vacancy occurring in said Board the Governor shall appoint, in the manner aforesaid, to fill the unexpired term.

SEC. 6. The Directors provided for in the preceding section shall qualify by taking the usual oath of office, and shall enter upon their duties within thirty days after their appointment.

SEC. 7. The Directors shall procure and adopt plans, drawings, and specifications for the construction of the Asylum and other buildings, and the improvement of the grounds, and shall make provision for the erection of the buildings, and cause the same to be carried out in accordance with such plans and specifications, and on such terms as they may deem proper; *provided*, such plans, drawings, specifications, provisions, and the terms thereof shall be submitted to the Governor, G. A. Shurtleff, and E. T. Wilkins, jointly, whom the Directors shall consult and advise with prior to the final adoption of any plans for such building; and further *provided*, that the Directors shall not adopt any plans for the Asylum or other buildings that will not secure the building and finishing of at least one section thereof suitable for the accommodation and treatment of patients with the appropriation named in this Act.

SEC. 8. The Directors and other officers shall have no interest, direct or indirect, in the furnishing of any building materials, or in any contracts for the same, or in any contract for labor in the erection of said Asylum, nor in any contract for any labor, material, or supplies for the maintenance thereof.

SEC. 9. The plans and specifications for said Asylum shall be upon the basis of accommodating not exceeding five hundred patients at any one time.

SEC. 10. The Board of Directors shall be known by the name and style of the Board of Directors of the — State Asylum for the Insane. The blank before the word "State" in this section to be filled by the name of the place, city, town, or county where said Asylum shall be located, and by that name they and their successors shall be known in law, may sue and be sued in any of the Courts of this State, and may receive, take, and hold property, both real and personal, in trust for the State for the use and benefit of said Asylum. They shall have power to govern, manage, and administer the affairs of said Asylum, and make and adopt by-laws for their own government and the government of said Asylum. They shall cause to be kept a full and correct record of their proceedings, which shall be open at all times to the inspection of any citizen desiring to examine the same. They shall hold stated meetings at the Asylum monthly, and a majority of the Board shall constitute a quorum for the transaction of business. They shall make a thorough inquiry into all the departments of labor and expense, and a careful examination of the buildings, property, and general condition of the Asylum. They shall submit to the Governor, biennially, on or before the first day of September next preceding the regular session of the Legislature, a report showing the receipts and expenditures, the general condition of the Asylum, the number of patients under treatment during the two preceding years, and such other matters touching the general affairs of the Asylum as they may deem advisable. As soon as they shall deem it necessary for the proper completion, furnishing, and management of said institution, the Board of Directors shall elect a Medical Superintendent, whose term of office shall be four years

and until his successor is elected and qualified; and thenceforth the Directors shall elect the Medical Superintendent when it becomes necessary by the expiration of his term of office, or by the occurrence of a vacancy in said office.

SEC. 11. The Board of Directors shall elect a Treasurer, who shall not be of their number, and who shall hold his office for two years, and until his successor is elected and qualified. Before entering upon his duties the Treasurer shall qualify by taking the usual oath of office, and shall give bond with good and sufficient sureties in a sum not less than thirty thousand dollars, payable to the people of the State of California, to be approved by the Board of Directors, and conditioned for the faithful performance of his duties according to law, and for the delivery to his successor of all books, papers, vouchers, moneys, and effects held by him by virtue of his office. The Board of Directors may increase the amount of the bonds of the Treasurer, and may require additional surety at any time, and they may remove him for good and sufficient cause. The Treasurer shall act as the Secretary of the Board of Directors, and have charge of their books and accounts; and he shall render to the State Board of Examiners monthly a detailed statement, under oath, of the expense of the preceding month, and shall perform such other duties as the Board of Directors may require. He shall have a yearly salary of six hundred dollars, payable quarterly out of any moneys appropriated to the use of the Asylum.

SEC. 12. Each Director shall receive as his compensation ten dollars for each meeting of the Board at which he shall be present, payable out of any moneys appropriated to the use of the Asylum; *provided*, that the sum paid to such Director shall not exceed one hundred and thirty dollars per annum; and *provided* further, that any Director whose residence is out of the county in which said Asylum is situated shall be allowed for traveling expenses mileage at the rate of ten cents per mile for the distance necessarily traveled in attending the monthly meetings of the Board.

SEC. 13. The Medical Superintendent shall be a well educated and experienced physician, and a regular graduate in medicine, and shall have practiced at least five years from the date of his diploma. He shall be the chief executive officer of the Asylum. He shall have the general superintendence of the buildings, grounds, and property thereof, subject to the laws and regulations of the Directors. He shall have the control of the patients, prescribe or direct their treatment, adopt sanitary measures for their welfare, and discharge such as in his opinion have permanently recovered their reason. He shall appoint, with the approval of the Directors, as many attendants and assistants as he may think necessary for the efficient and economical care and management of the Asylum, and, with the consent of the Board of Directors, fix their compensation and discharge any of them. He shall prescribe the duties of the subordinate officers and the employés, maintain discipline among them, and enforce obedience to the laws, rules, and regulations adopted for the government of the institution. He shall estimate quarterly, in advance, the probable expenses of the Asylum, and submit the same to the Board of Directors at their last regular meeting preceding the commencement of such quarter for their approval. And the Controller is hereby authorized and directed to draw his warrants for the amount of said estimate approved by the Directors, as soon as the same shall have been approved by the State Board of Examiners, in three equal sums, in favor of the Directors, to be drawn monthly; and

the Treasurer is authorized and directed to pay the same out of any moneys appropriated by law for the use and benefit of said Asylum. The Medical Superintendent shall estimate and report to the Directors the amount, kind, and quality of provisions, fuel, and clothing required for the six months ending on the first day of May and November of each year; and the Directors shall then advertise for contracts for furnishing said supplies for three successive weeks in one newspaper published in the vicinity of the Asylum, and in one newspaper published in each of the Cities of San Francisco and Sacramento. The contract or contracts shall be awarded to the lowest bidder or bidders, upon their giving to the Board of Directors satisfactory security for the faithful performance of the same. Necessary expenditures, other than those for provisions, fuel, and clothing, may be made by the Medical Superintendent, subject to the approval of the Board of Directors. The Medical Superintendent shall cause to be kept full and correct accounts and records of his official transactions from day to day, in books provided for that purpose, in the mode prescribed in the by-laws. He shall see that his accounts are fully made up to the first day of August of each year, and shall submit his annual report to the Board of Directors as soon thereafter as practicable. He shall reside at the Asylum and shall not engage in private practice, but shall be at all times in attendance at the Asylum unless he obtain leave of absence from the President of the Board of Directors. He shall receive an annual salary of three thousand dollars, payable monthly as other attachés are paid; and he and his family, if he have one, shall be furnished room, household furniture, provisions, fuel, and lights, at and from the supplies of the Asylum.

SEC. 14. When said Asylum shall be ready for the admission of patients, and thenceforth when a vacancy occurs in the office hereby authorized, the Directors, upon the nomination of the Medical Superintendent, shall elect an Assistant Physician, who shall be a graduate in medicine. He shall qualify by taking the usual oath of office. His salary shall be fixed by the Board of Directors, to be paid in the same manner as the other employés, and not to exceed two thousand dollars a year. He shall reside at the Asylum, and not be allowed to engage in private practice, but shall be in attendance at all times at the Asylum, except when he may obtain leave of absence from the Medical Superintendent. He shall perform such duties as may be directed by the Medical Superintendent and prescribed by the by-laws. He and his family, if he have any, shall be supplied with room, board, fuel, and lights at the Asylum. His term of office shall be four years, and until his successor is appointed and qualified. The duties of the Medical Superintendent, in his absence or sickness, shall be performed by the Assistant Physician.

SEC. 15. The Directors may remove any officer or employé of the Asylum by a vote of four fifths of their number, for habitual and willful neglect of duty, or for refusal to comply with the requirements of the laws, by-laws, and regulations made for the establishment and government of the institution.

SEC. 16. The County Judge of any county in this State, and the Probate Judge of the City and County of San Francisco, shall, upon application under oath, setting forth that a person, by reason of insanity, is dangerous to be at large, cause such person to be brought before him; and he shall summon to appear, at the same time and place, two or more witnesses who well knew the accused during the time of the alleged in-

sanity, who shall testify under oath as to conversation, manners, and general conduct upon which said charge of insanity is based; and shall also cause to appear before him, at the same time and place, two physicians, who shall be regular graduates in medicine, before whom the Judge shall examine the charge; and if, after a careful hearing of the case and a personal examination of the alleged insane person, the said physicians shall certify on oath that the person examined is insane, and the case is of a recent or curable character, or that the said insane person is of a homicidal, suicidal, or incendiary disposition, or that from any other violent symptoms the said insane person would be dangerous to his or her own life, or to the lives or property of the community in which he or she may live; and if said physicians shall also certify to the name, age, nativity, residence, occupation, length of time in this State, State last from, previous habits, premonitory symptoms, apparent cause and class of insanity, duration of the disease and present condition, as nearly as can be ascertained by inquiry and examination; and if the Judge shall be satisfied that the facts revealed in the examination establish the existence of the insanity of the person accused, and that it is of a recent or curable nature, or of a homicidal, suicidal, or incendiary character, or that from the violence of the symptoms the said insane person would be dangerous to his or her own life, or to the lives or property of others, if at large, he shall direct the Sheriff of the county, or some suitable person, to convey to and place in charge of the officers of the Insane Asylum of this State, to which the order is directed, such insane person, and shall transmit a copy of the complaint and commitment and physicians' certificate, which shall always be in the form as furnished to the Courts by the Medical Superintendent of said Asylum; and the person taking such insane person to the Insane Asylum shall be allowed therefor the same fees as are allowed by law to the Sheriff in such cases, to be paid in like manner. And the physicians attending the examination aforesaid shall be allowed by the Board of Supervisors of the county in which the examination is had five dollars each, unless they are otherwise paid.

SEC. 17. No case of idiocy, imbecility, harmless, chronic, mental unsoundness, or acute mania a potu shall be committed to this Asylum; and whenever in the opinion of the Superintendent, after a careful examination of the case of any person committed, it shall be satisfactorily ascertained by the said Superintendent that the party had been unlawfully committed, and that he or she came under the rule of exemptions provided for in this section, he shall have the authority to discharge such person so unlawfully committed, and return him or her to the county from which committed, at the expense of said county.

SEC. 18. The Judge shall inquire into the ability of insane persons committed by him to the Asylum to bear the actual charges and expenses for the time that such person may remain in the Asylum. In case an insane person committed to the Asylum under the provisions of this Act shall be possessed of real or personal property sufficient to pay such charges and expenses, the Judge shall appoint a guardian for such person, who shall be subject to all the provisions of the general laws of this State in relation to guardians, as far as the same are applicable; and when there is not sufficient money in the hands of the guardian the Judge may order a sale of property of such insane person, or so much thereof as may be necessary, and from the proceeds of such sale the guardian shall pay to the Board of Directors the sum fixed upon by them each month, quarterly in advance, for the maintenance of such ward;

and he also, out of the proceeds of such sale, or such other funds as he may have belonging to his ward, pay for such clothing as the Medical Superintendent shall from time to time furnish to such insane person; and he shall give a bond, with good and sufficient sureties, payable to the Board of Directors and approved by the Judge, for the faithful performance of the duties required of him by this Act as long as the property of his insane ward is sufficient for the purpose. The Board of Directors shall furnish such blank bonds as are required by this section to the several County Judges in this State, and to the Probate Judge in the City and County of San Francisco. A breach of any bond provided for in this Act may be prosecuted in the District Court of any county in this State in which any one of the obligors may reside, and the same shall be prosecuted by the District Attorney of the county in which the action shall be brought, and shall be conducted throughout and the judgment shall be enforced as in a civil action for the recovery of a debt. Should there remain in the hands of the Board of Directors or their Treasurer, at the time any insane person is discharged, any money unexpended so paid by the guardian or kindred, the same shall be refunded; *provided*, that the Board of Directors shall not be required to refund any money for a fraction of a month; but upon the death of any insane person, after paying the ordinary burial expenses, the remainder of any moneys received from the guardian or on deposit with the Board of Directors or their Treasurer, shall be refunded to the person or persons thereto entitled on demand. Any moneys found on the person of an insane person at the time of arrest, shall be certified to by the Judge and sent with such person to the Asylum, there to be delivered to the Medical Superintendent, who shall deliver the same to the Treasurer, to be applied to payment of the expenses of such person while in the Asylum; but upon the recovery of such insane person all sums not exceeding one hundred dollars shall be returned to him when he is discharged from the Asylum. The kindred or friends of an inmate of the Asylum may receive such inmate therefrom, on their giving satisfactory evidence to the Judge of the Court issuing the commitment that they or any of them are capable and suited to take charge of and give proper care to such insane person and give protection against any of his acts as an insane person. If such satisfactory evidence appear to the Judge he may issue an order, directed to the Medical Superintendent of the Asylum, for the removal of such person; but the Medical Superintendent shall reject all other orders or applications for the release or removal of any insane person. And if after such removal it is brought to the knowledge of the Judge, by verified statement, that the person thus removed is not cared for properly, or is dangerous to persons or property by reason of such want of care, he may order such person returned to the Asylum.

SEC. 19. Non-residents of this State, conveyed or coming herein while insane, shall not be committed to or supported in the State Asylum for the insane; but this prohibition shall not prevent the commitment to and temporary care in said Asylum of persons stricken with insanity while traveling, or temporarily sojourning in the State, or sailors attacked with insanity upon the high seas and first arriving thereafter in some port within this State.

SEC. 20. When a section of the Asylum provided for in this Act is ready for the accommodation of patients, the Judges in the counties more convenient to said Asylum than to the Asylum at Stockton, who are authorized herein to commit insane persons, shall order all persons

thereafter by them duly examined and declared insane, to the institution established by this Act; but the County Judges of this State or the Probate Judge of the City and County of San Francisco may order the transfer of any insane person committed from their respective counties from one State Asylum to the other, upon the joint recommendation or consent of the Medical Superintendents of each, the cost of such transfer to be paid by the guardian or friends of the patient transferred.

SEC. 21. The Directors of the Insane Asylum at Stockton are authorized and directed to cause to be finished the new building occupied by the females of that institution by erecting the north wing of said building, which shall be made to correspond with the south wing thereof, and in accordance with the plan originally adopted.

SEC. 22. To carry out the provisions of this Act the State Board of Equalization shall levy at the time other State taxes are levied, in the years eighteen hundred and seventy-two and eighteen hundred and seventy-three, a tax of such number of cents on each one hundred dollars value of taxable property in the State as will produce a net sum of one hundred and seventy-five thousand dollars in each of said years, for the purpose of creating a special Fund, to be denominated the "Special Insane Asylum Fund;" and the assessment and collection of said tax shall be performed in the same manner and at the same time as the ad valorem State tax for other purposes is assessed and collected.

SEC. 23. Of the money collected from the special tax herein provided, two fifths, as it accrues, shall be expended in completing and furnishing the building at Stockton occupied by the females of that Asylum, until the sum drawn therefor amounts to one hundred and thirteen thousand dollars; and three fifths of the money derived from said tax, together with any sum remaining of the two fifths, over and above one hundred and thirteen thousand dollars, shall be expended in establishing a new Asylum according to the provisions of this Act; *provided*, one section thereof, on the plan adopted, shall first be built, furnished, and opened, as soon as practicable, for the admission of patients; and further *provided*, if it be so opened before the meeting of the next Legislature, the maintenance thereof shall be temporarily paid out of this Special Fund until other provision shall be made by law for its support.

SEC. 24. The Controller of State is hereby authorized and directed to draw his warrants on the Treasurer of State in favor of the respective Directors of each Asylum, on their requisition upon the Fund hereby created, in accordance with the provisions of this Act; *provided*, not more than fifteen thousand dollars shall be drawn at any one time for building purposes; and *provided* further, that a detailed account of the expenditures of the sum previously drawn shall be filed with the State Board of Examiners by said Directors before the approval of any other requisition from the same Board of Directors for money for the purposes aforesaid.

SEC. 25. This Act shall take effect from and after its passage.

[*This statute needs simplifying, and the law made more general. A Board of Examiners might be appointed by the Governor in every city or town where physicians' prescriptions are compounded; said Board to consist of three physicians or pharmacutists from each city or town, who shall examine all applicants for a license to practice pharmacy, and who shall have power to issue a license or diploma to such as are found to be properly qualified.*]

CHAPTER CCCCLIV.

An Act to regulate the practice of pharmacy in the City and County of San Francisco.

[Approved March 28, 1872.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. From and after the first day of June, A. D. eighteen hundred and seventy-two, it shall be unlawful for any person, unless a registered pharmacist or a registered assistant pharmacist within the meaning of this Act, to open or conduct any pharmacy or store for retailing, dispensing, or compounding medicines or poisons, except as hereinafter provided.

SEC. 2. Any person, in order to be registered, must be either a graduate in pharmacy, a licentiate in pharmacy, a practicing pharmacist, or a practicing assistant pharmacist.

SEC. 3. Graduates in pharmacy must be such as had four years experience in stores where prescriptions of medical practitioners are compounded, and each must have obtained a diploma from a college of pharmacy within the United States, or from an authorized foreign institution or Examining Board. Licentiates in pharmacy are such as have had four years experience in stores where prescriptions of medical practitioners are compounded, and shall have passed an examination before the Board of Pharmacy; also such foreign pharmacists as shall present satisfactory credentials or certificates of their attainments to the Board of Pharmacy. Practicing pharmacists are such persons only as at or prior to the passage of this Act have kept and continue to keep open store in the City and County of San Francisco for compounding and dispensing of the prescriptions of medical practitioners, and for the sale of medicines and poisons. Practicing assistants in pharmacy are such persons of not less than eighteen years of age as at or prior to the passage of this Act have had two years experience in the compounding of the prescriptions of medical practitioners in the store of a practicing pharmacist, and shall furnish satisfactory evidence of the same to the Board of Pharmacy. Persons of less than eighteen years of age, or less than four years experience, are, as junior assistants or apprentices, to be under the immediate supervision of a registered pharmacist or assistant pharmacist until they have become graduates or licentiates in pharmacy.

SEC. 4. The members of the California Pharmaceutical Society residing in San Francisco shall, during the month of May, eighteen hundred and seventy-two, and every third year thereafter, during the month of

May, elect five of the most competent pharmacists of San Francisco to serve as a Board of Pharmacy. The members of this Board shall, within thirty days after their appointment, individually take and subscribe before the County Clerk an oath faithfully and impartially to discharge the duties prescribed by this Act. They shall hold office for the term of three years, and until their successors are appointed and qualified, and in each case of vacancy the said Board of Examiners shall select from three nominees elected at a meeting of the said society. The Board shall organize for the transaction of business in the City of San Francisco by the election for the whole term of President and Secretary. Three members of the Board shall constitute a quorum. They shall meet at least quarterly, and have power to make by-laws for the proper fulfillment of their duties. The duties of this Board shall be to transact all business pertaining to the legal regulations of the practice of pharmacy and the retailing of poisons, and to examine and register all pharmacists. All persons applying for examination shall pay to the Secretary a fee of five dollars; and on passing the examination, shall be furnished with a certificate signed by the President and the Examiners.

SEC. 5. It shall be the duty of the Secretary to keep a book of registration open at some convenient place, of which due notice shall be given through the public press, in which shall be entered, under the supervision of the Board, the names, titles, qualifications, and places of business of all persons coming under the provisions of this Act; and it shall be the duty of all such persons to appear before the Board or its Secretary, within a period of thirty days after its organization, and be registered. The fee for the first registration of graduates, licentiates, and practicing pharmacists, shall be two dollars; for assistants, one dollar. It shall be the duty of every person registered to have his registration renewed every year in the month of January, the fee for which shall be one dollar, and upon changing his place of business or engagement, to notify the Secretary within thirty days. The Secretary shall make all necessary alterations in the register, and notify all persons, on or before the tenth day of February, who shall not have renewed their registration, for which notification the Secretary shall receive a fee of fifty cents; and in case no answer is received within fourteen days, such name shall be erased, unless an excuse satisfactory to the Board be presented; *provided*, always, that the said name shall be restored on payment of fifty dollars to the Secretary of the Board within one year. The Secretary shall give receipts for all moneys received by him, and pay said moneys to the Treasurer of the California Pharmaceutical Society, taking his receipt therefor. The salary of the Board of Pharmacy and of the Secretary shall be fixed by the Board of Directors of the California Pharmaceutical Society, to be paid out of the registration fees and fines.

SEC. 6. From and after the first day of June, eighteen hundred and seventy-two, every registered pharmacist who shall knowingly, intentionally, and fraudulently adulterate or cause to be adulterated, any drugs, chemicals, or medicinal preparation, shall be held guilty of a misdemeanor, and on conviction shall be fined fifty dollars in the first, one hundred dollars in the second, and on conviction in the third case his name shall be erased from the register.

SEC. 7. *And be it further enacted*, That on and after the first day of June, eighteen hundred and seventy-two, it shall be unlawful for any person in the City and County of San Francisco to retail any poisons enumerated in Schedules "A" and "B," appended to this Act, without distinctly labeling the bottle, box, vessel, or paper, and wrapper or cover

in which said poison is contained, with the name of the article, the word "Poison," and the name and place of business of the seller. Nor shall it be lawful for any person to sell or deliver any poison enumerated in Schedules "A" and "B" to any person, unless on due inquiry it is found that the person is aware of its poisonous character, and that it is to be used for a legitimate purpose. Nor shall it be lawful for any person to sell or deliver any poison included in Schedule "A" without, before delivering to the buyer, making or causing to be made an entry in a book kept for that purpose only, stating the date of sale, the name and address of the purchaser, the name and quantity of the poison sold, the purpose for which it is stated by the purchaser to be required, and the name of the dispenser; said book to be always open for inspection by the proper authorities, and to be preserved for at least five years. The provisions of this section shall not apply to the dispensing of poisons (in not unusual doses or quantities) upon the prescriptions of practitioners of medicine.

SEC. 8. Be it provided that nothing contained in the foregoing section shall apply to or interfere with the business of any practitioner of medicine who does not keep open shop for the dispensing and retailing of medicines and poisons, nor with the business of wholesale dealers.

SEC. 9. Any person who shall attempt to procure registration for himself or for any other person under this Act by making or causing to be made any false representations, shall be deemed guilty of a misdemeanor, and shall upon conviction thereof be fined in a sum not exceeding five hundred dollars. Any registered pharmacist who shall permit the compounding and dispensing of prescriptions of medical practitioners in his store by persons not registered, except by junior assistants under the direct supervision of registered persons, or any person not registered who shall keep open shop for the retailing or dispensing of medicines and poisons, or who shall fraudulently represent himself to be registered, and any registered person who shall fail to comply with the regulations of this Act in regard to the retailing and dispensing of poisons, shall for every such offense be deemed guilty of a misdemeanor, and on conviction thereof be fined fifty dollars.

SEC. 10. All persons registered under this Act shall be exempt and free from all jury duty in the City and County of San Francisco.

SEC. 11. All Acts and parts of Acts in conflict with the provisions of this Act, in so far as they so conflict, are hereby repealed.

SCHEDULE "A."

Arsenic and its preparations, corrosive sublimate, white precipitate, red precipitate, biniodide of mercury, cyanide of potassium, hydrocyanic acid, strychnia, and all other poisonous vegetable alkaloids and their salts, essential oil of bitter almonds, opium and its preparations, except paregoric, and other preparations of opium containing less than two grains to the ounce.

SCHEDULE "B."

Aconite, belladonna, colchicum, conium, nux vomica, henbane, savin, ergot, cotton root, cantharides, digitalis, and their pharmaceutical preparations, croton oil, chloroform, chloral hydrate, sulphate of zinc, sugar of lead, mineral acids, carbolic acid, and oxalic acid.





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